April 15, 1957

PAPER TRADE JOURNAL

- Ingenuity in Equipment and Methods in Moraine Finishing Operations
- Latest Thoughts on Groundwood, Kraft and Cylinder Machine Instrumentation
- Accuracy of Turbine Governing Systems and Effect of Speed Range
- Cathodic Protection Against Corrosion in Pulp and Paper Mills

University Microfilms
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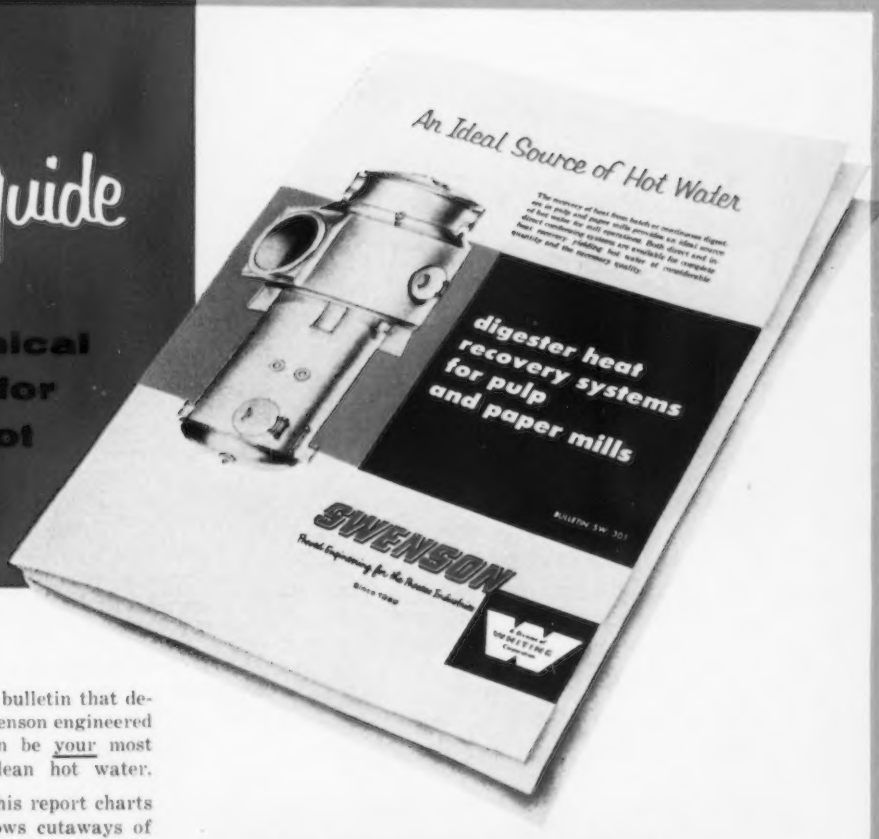
Here's Your Guide to an economical source for clean hot water!



Get your copy of the new bulletin that describes how and why a Swenson engineered heat recovery system can be your most economical source for clean hot water.

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...a new source of clays... for the Paper Industry

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Location: Sandersville, Georgia

In one of the world's richest deposits of high grade kaolin clays, new research, mining and processing facilities of the latest types will be in operation in the Spring of 1957. This large enterprise is designed primarily to provide an additional source of supply of quality clays for the Paper Industry.

The tremendous growth of the Paper Industry within recent years and the consequent unprecedented increase in demand for coating and filler clays, make the establishment of the new company a sound venture. It is of particular importance to those pulp and paper manufacturers whose materials procurement policies call for two or more separate sources of supply.

American Industrial Clays, Inc., welcomes your inquiries for a complete range of spray dried and acid flocced kaolin clays for the Pulp and Paper Industry.

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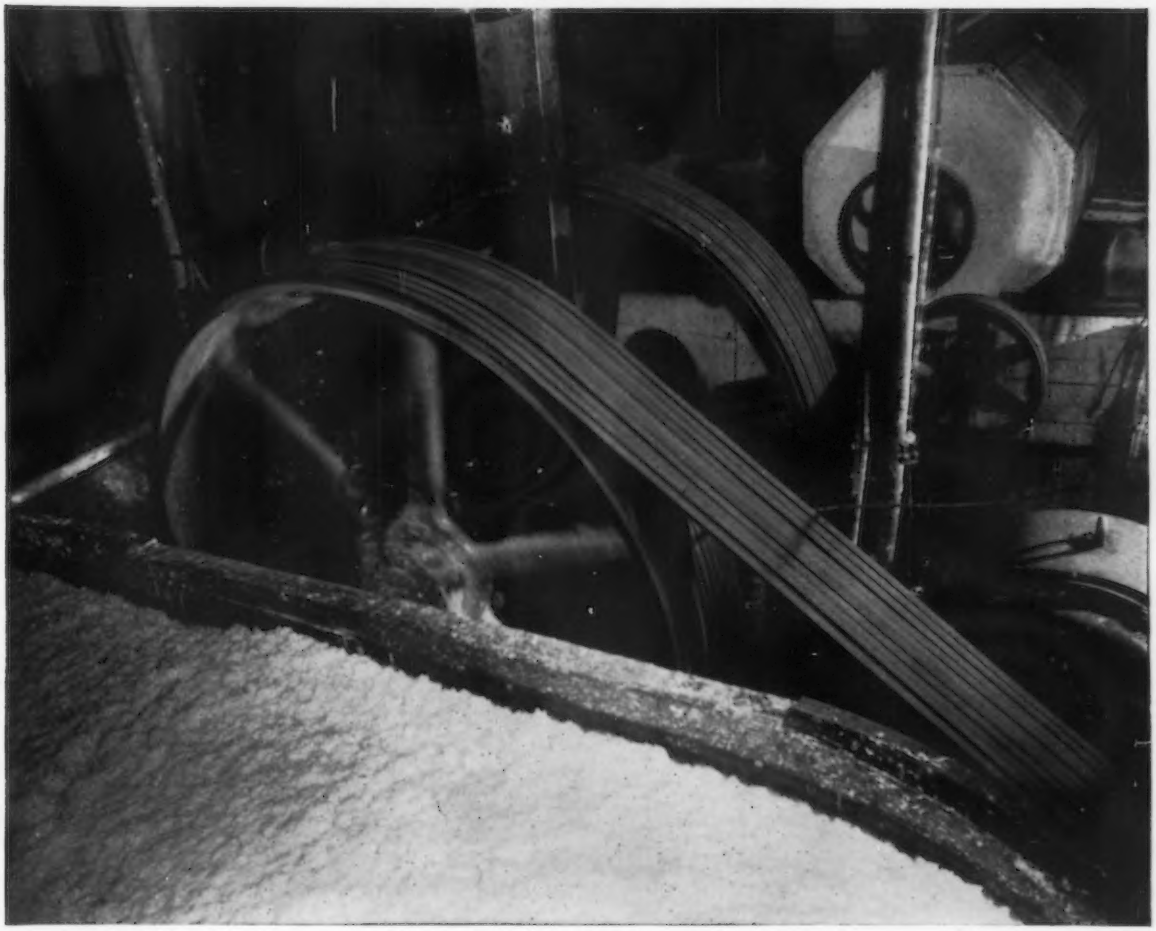
B.F.Goodrich



They cut production costs 25% with B. F. Goodrich V belts

A typical example of B. F. Goodrich improvement in rubber

ALL the pulp beaters in this paper mill used to be driven by flat leather belts connected to a line shaft. When the main belt broke down, production stopped for 24 hours. Some of these shutdowns cost the company several thousand dollars.

Then they switched to individual V belt drives, equipped with B. F. Goodrich Grommet belts. Two years later, when this picture was taken, the B. F. Goodrich Grommet V belts were still going strong, hadn't lost a minute of the paper mill's time. The plant superintendent estimates a 25% saving in production costs alone.

Grommets are two extra strong cord loops inside the belts, like twisted cables except that they're endless. Unlike ordinary belts, there are no center cords in the Grommet belt, so it is more flexible, can "give" temporarily and absorb shock loads.

Today's B. F. Goodrich V belts are the result of constant improvement—better processes for prestretching cords, for improving cord adhesion, for reducing internal heat and friction. In these and many other ways B. F. Goodrich belt engineers have successfully attacked the common causes of V belt failure, and in many cases, more than doubled or tripled belt service life.

Let your B. F. Goodrich distributor show you how this longer belt life, this ability to stand harder use, can reduce your V belt costs per year, make other savings in operating and maintenance costs. *B. F. Goodrich Industrial Products Company, Dept. M-952, Akron 18, Ohio.*

Grommet—T. M. The B. F. Goodrich Co.

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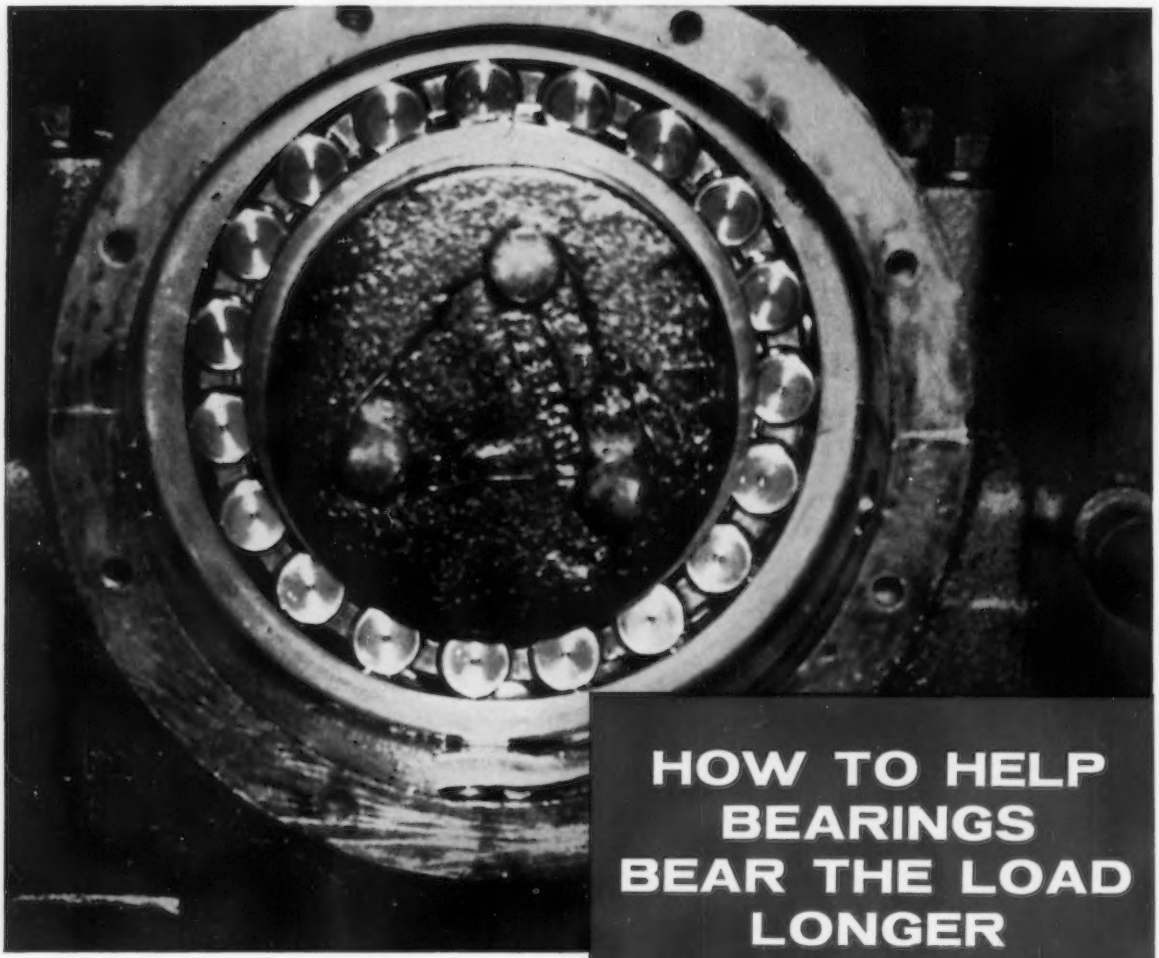
Un-retouched photo of a Texaco-lubricated dryer roll bearing. It shows the cleanliness you can expect from Texaco Products.



HOW TO HELP BEARINGS BEAR THE LOAD LONGER

To keep bearings "like new," the oil you use must have fully detergent and dispersive properties. *Texaco Paper Machine Oil HD* has proved its superiority in these qualities even on heavily loaded bearings running at temperatures of 300°F. or more. *Texaco Paper Machine Oil HD* prevents accumulation of wear-causing carbon, dirt, sludge or other contaminants on vital bearings.

But there's more. With *Texaco Paper Machine Oil HD*, water separation is remarkably quick and easy. And machines are fully protected from rust or corrosion whether they're running or idle.

To give enclosed reduction gears a new lease on life, and smoother, quieter operation, use *Texaco Meropa Lubricant*. Its longer-lasting EP characteristics give full protection, even in severe service.

An experienced Texaco Lubrication Engineer will be glad to furnish more data. Just call the nearest of more than 2,000 Texaco Distributing Plants in the 48 States or write:

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PAPER TRADE JOURNAL

Published Weekly Since 1872

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REMEMBER THESE DATES

MAY 20-22: Eighth Coating Conference, Pfister Hotel, Milwaukee, Wis.

MAY 20-22: National Paperboard Assn., Spring Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

MAY 21-23: American Pulp and Paper Mill Superintendents Assn. National Meeting, Hotel Congress, Chicago, Ill.

JUNE 5-7: Technical Section C. P. P. A. Summer Meeting, Saranac Inn, Saranac, N. Y.

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All other Countries	20.00	30.00	40.00

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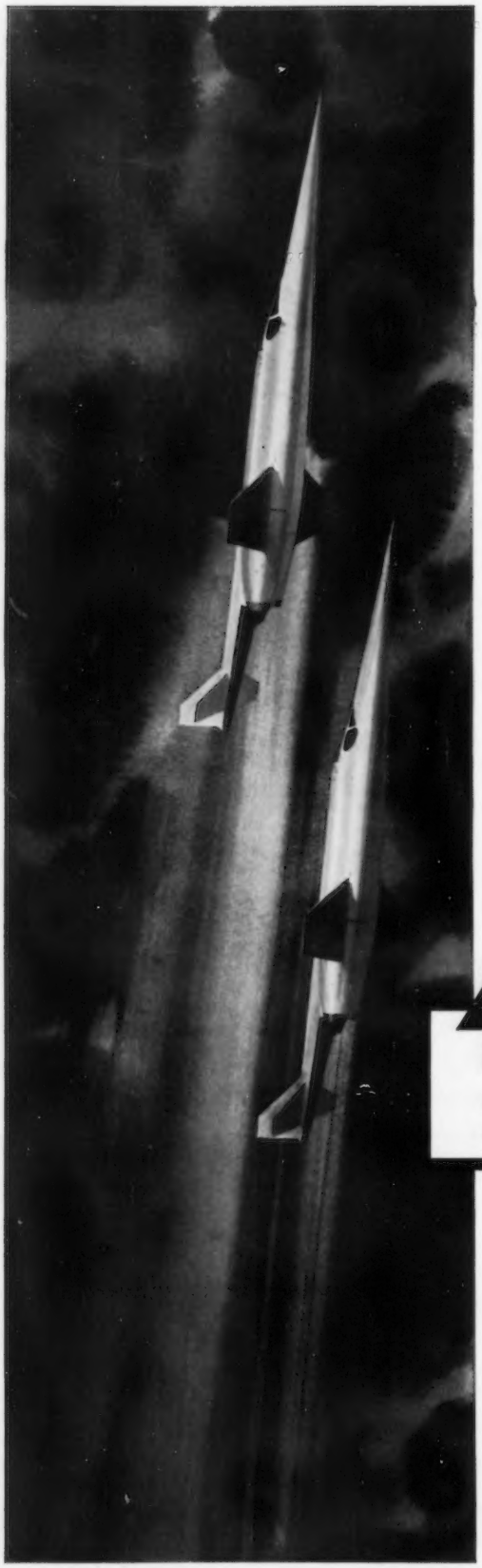

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Brown and Root's record
of early project completion
means a bonus of unexpected production;
which in analysis,
presents a reduction in
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EFFICIENT SEPARATION

at low cost

improved pulp quality, too!

ALLIS-CHALMERS

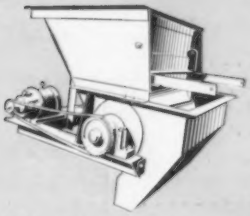
CHIP SCREENS

In the Allis-Chalmers multiple-deck chip screen, the circular throw of the balanced mechanism imparts a uniform vibration to the entire screen surface and body structure. The resulting constant rate of chip travel and rapid stratification give you high efficiency. Capacity is further increased by a feed spout which turns incoming chips on their sides to prevent up-ending of chips and blinding of screen cloth. Additional protection against blinding may be obtained through the installation of a *Sta-Kleen* deck.

The price tag on the A-C chip screen is surprisingly low. And there's long-term economy, too, because power requirements are cut and maintenance reduced by the simplified two-bearing mechanism.

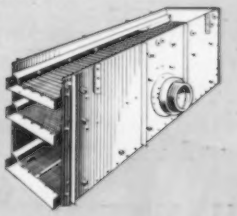
Allis-Chalmers chip screens also help you maintain positive control over pulp quality by removing an extraordinarily high percentage of chip dust and dirt.

Allis-Chalmers offers two types of chip screens — inclined and horizontal. For complete information, see your A-C representative or write for Bulletin 07B6353B. Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.



Chip Screen Feeder Improves Efficiency

Eliminates surges in feed and provides full width feeding. Screening is more efficient and more profitable because all of the screen area works full time.



Triple-Deck Screen Multiplies Advantages

Triple-deck screen removes slivers on top deck. Second deck relieves load on third deck, so that more pin chips may be reclaimed — more dust and dirt removed.

A-C ALLIS-CHALMERS

A-5312

ALLIS-CHALMERS

Sta-Kleen is an Allis-Chalmers trademark.

THE "RED CARPET" IS NOT ENOUGH

In the wild scramble for new industries going on all over the country today, industrial prospects are being "wined and dined" and in some extreme instances have been virtually offered "the county courthouse with a fence around it."

While community attitudes are undeniably important to industry, business executives engaged in the serious task of selecting a plant location will look to other basic factors which will spell success or failure to their particular enterprise.

Of vital importance are details on: sources of raw materials, fuel, water, power, transportation, labor, plant site characteristics, construction costs and distribution to existing markets—to name only part of the usual governing factors. And this is where we come in. We know the South and we speak the language of industry. Our long experience in the industrial development field places us in position to render invaluable assistance to industries seeking new plant locations.

Address: Warren T. White
Assistant Vice President
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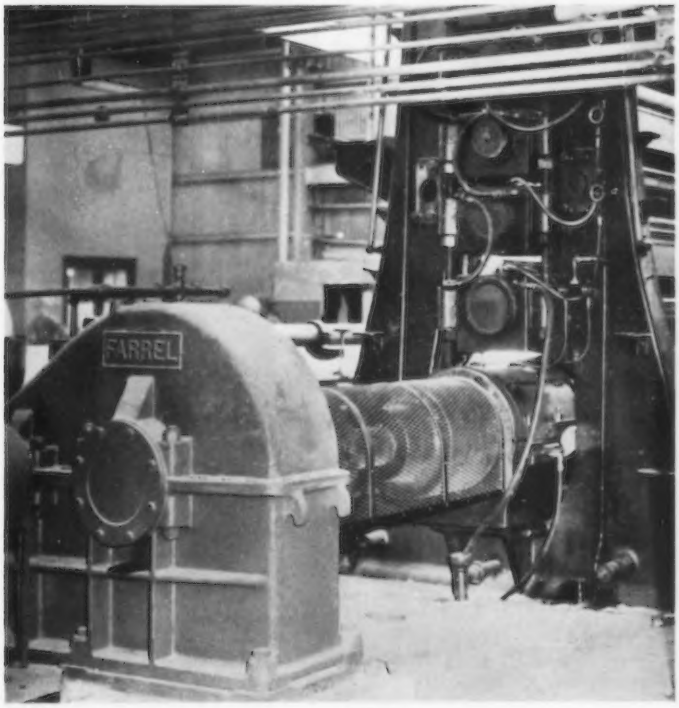
Norfolk 10, Virginia

HERE'S WHY FARREL® SPEED REDUCERS CAN SOLVE YOUR DRIVE PROBLEMS...

There are 35 Farrel speed reducers in this mill.



This is one of 80 Farrel units installed in a southern mill.

Unlike most "standardized" products, Farrel speed reducers are standard only in their principal features. They are adaptable in critical detail.

The gears and pinions can be proportioned to meet specific load, speed and service requirements. Input and output shafts can be varied in size, in material, and in extension. Even some housing dimensions can be modified to meet problems in mounting.

This design flexibility has resulted in the solution of innumerable application problems. There is no need to compromise. You can ask for—and get—a unit that will meet your exact needs.

Mills throughout the country have "discovered" this unique feature of Farrel speed reducers. That is why so many of these units can be found transmitting power to suction presses, smoothing presses, dryers, couches, calenders, reels and other equipment in modern mills.

Write for further details of these problem-solving units. Ask for a copy of Bulletin 450.

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Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
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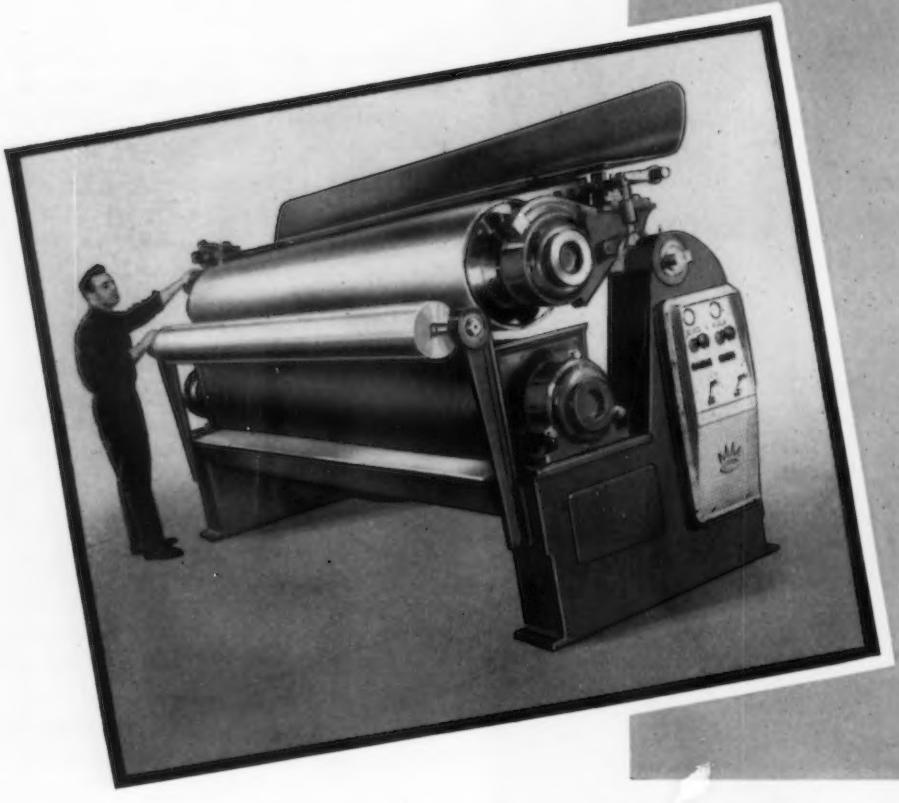
FB-1117

MODERN PRESSES *require* MODERN DOCTORS



It is good business to specify the doctor that is equal in engineering to the machine.

You can be sure if it is LODDING.

On this Manchester Machine Company size press only LODDING could match the quality of the machine.

LODDING ENGINEERING CORPORATION
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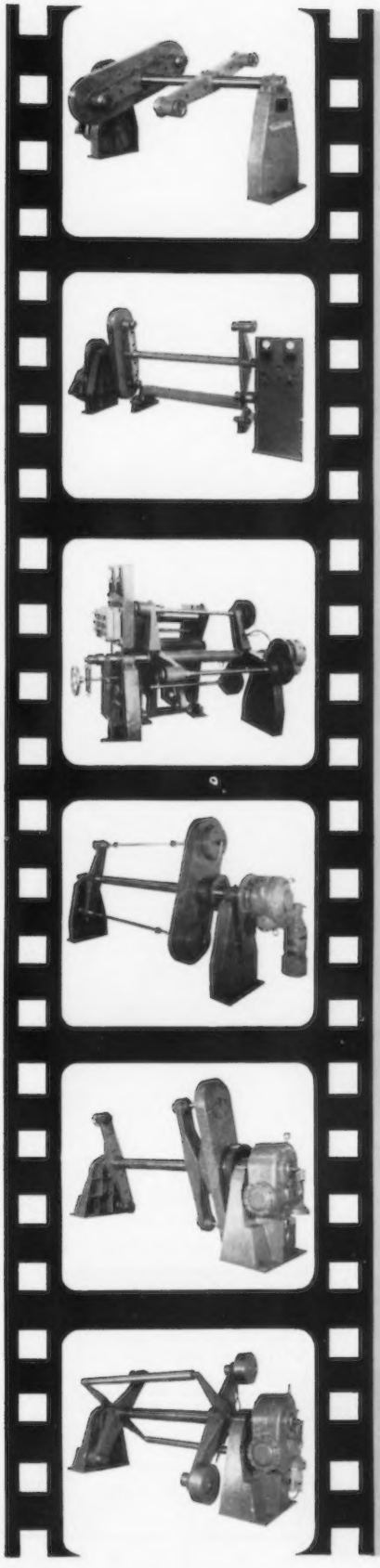

Rotating Unwinds And Winds For Continuous Operation

Black-Clawson's Dilts Division furnishes a complete line for all applications.

Two arm rotating type unwinds and winds from the base reel to fully automatic reels for high speed continuous automatic splicing.

A selection of models designed to handle tissue, paper, board, film, foil or fabric from small rolls to rolls weighing 12,000 lbs. of various widths and diameters.

Used on coaters, laminators, printing presses, plastic take-offs and super calenders.

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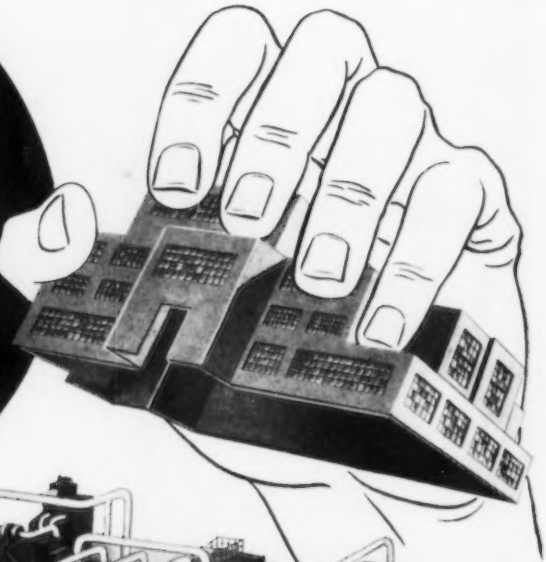

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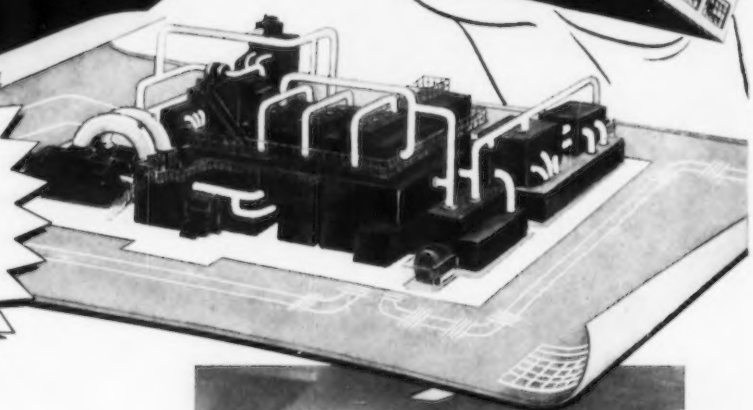
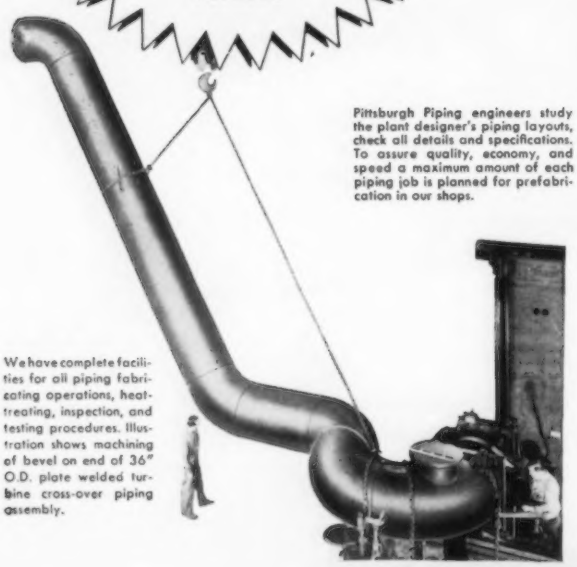


Pittsburgh Piping engineers study the plant designer's piping layouts, check all details and specifications. To assure quality, economy, and speed a maximum amount of each piping job is planned for prefabrication in our shops.



We have complete facilities for all piping fabricating operations, heat-treating, inspection, and testing procedures. Illustration shows machining of bevel on end of 36" O.D. plate welded turbine cross-over piping assembly.

We assume responsibility for every phase of a piping job — from blueprint through erection. Our engineers are specialists — thoroughly experienced in the theoretical and practical aspects, as well as in the code and insurance requirements, of high-temperature, high-pressure piping.

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Harbison-Walker manufactures all classes of refractories including monoliths, mortars and insulating refractories, for every rotary kiln requirement.

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For Reburning Lime Sludge

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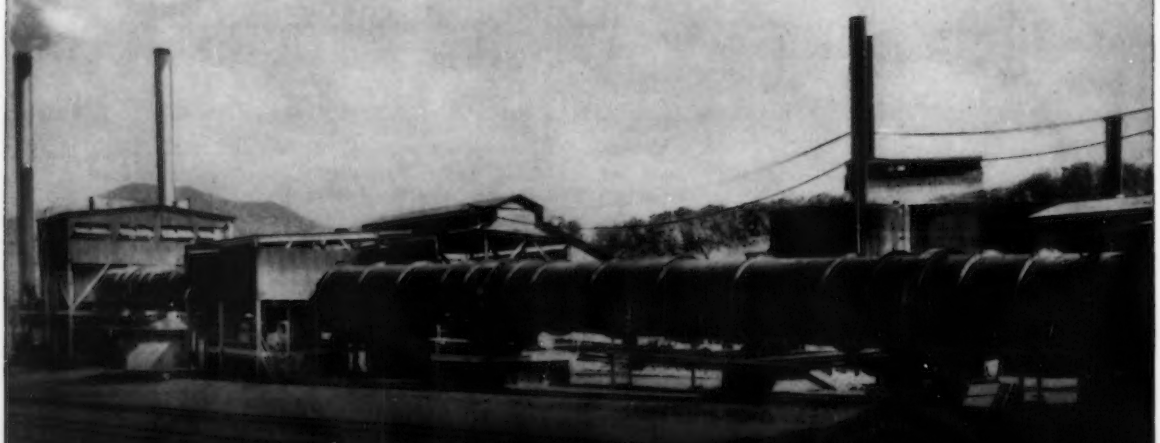
Shown below is the second Smidth Rotary Kiln for reburning lime sludge at the Canton, North Carolina, plant of the Champion Paper & Fiber Co.



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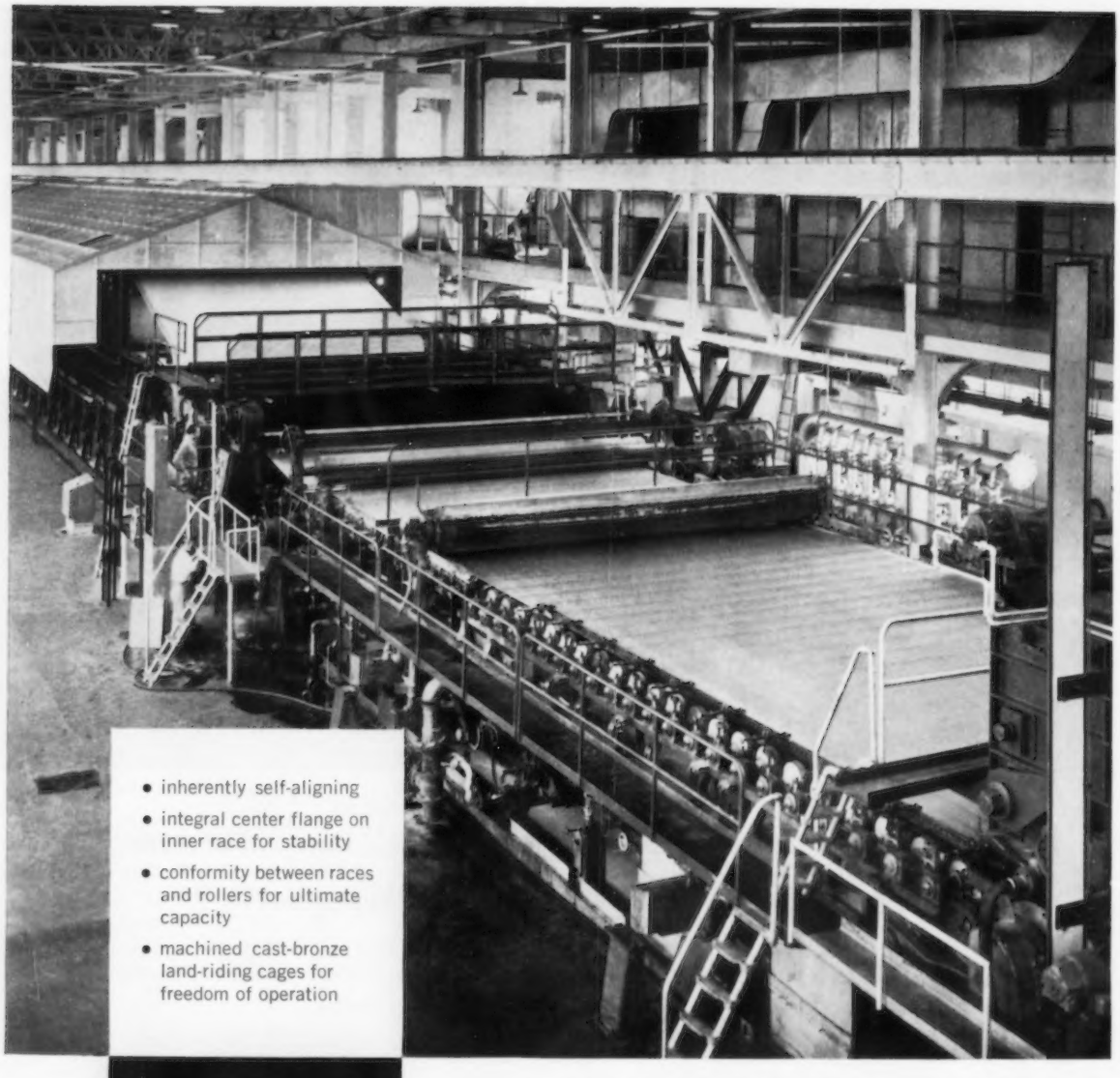

- inherently self-aligning
- integral center flange on inner race for stability
- conformity between races and rollers for ultimate capacity
- machined cast-bronze land-riding cages for freedom of operation

A New World's Record!

World's record on 50# Kraft bag paper—2,200 fpm—is held by this 232-inch paper machine built by Beloit Iron Works for St. Regis Paper Company at Jacksonville, Florida.

Contributing to this performance are 718 Torrington Spherical Roller Bearings on wire rolls, press felt rolls, top press rolls, paper and felt driers and idlers, calenders, suction couch and press rolls, reels and winders. Inherently self-aligning, these bearings compensate for shaft deflection across the machine and eliminate need for periodic realignment.

Torrington Spherical Roller Bearings are available from stock with straight or tapered bores for shaft or adapter mounting. When you are counting on production, count on Torrington Spherical Roller Bearings for smoother, faster, more economical service from wet end to winder. *The Torrington Company*, South Bend 21, Ind.—and Torrington, Conn.

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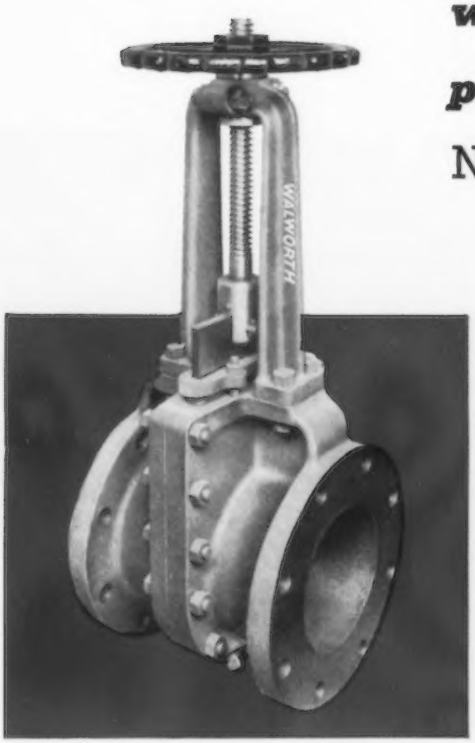
ASSURE *clogproof valve operation on stock lines with* WALWORTH *pulp stock valve*

No. 757F sizes 4" to 16" inclusive

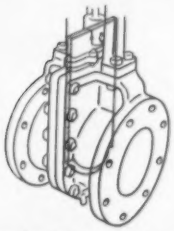


Clogproof operation makes this Walworth Gate Valve particularly suitable wherever pipelines transport pulp stock or other suspensions carrying solids or fibrous matter. There are no bonnet recesses or body obstructions to accumulate matter . . . circular ports permit full flow . . . semi-circular gate closes to a tight leakproof shutoff.

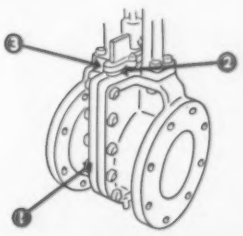
Suitable for a wide range of fluids and operating conditions, this unique valve design is available in All Bronze, Iron Body with Bronze Trim, Iron Body with Stainless Steel Trim, and All Stainless Steel construction. Handwheel, sliding-stem-and-lever, motor, and cylinder operation are available.

The complete Walworth line now includes valves and fittings for "across-the-board" use in pulp and paper mills. Gate, globe, angle, check and lubricated plug valves, as well as pipe fittings, in all conventional sizes and types. For additional technical data on the No. 757F — or any Walworth product — see your nearby Walworth Distributor or write:

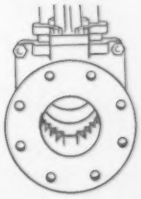
Check these features:



Semi-circular Shearing Gate...Sharpened, beveled edge of the gate shears through matter without touching inlet or outlet halves of the body. At point of closure a tight, leakproof shutoff occurs as the heel of the gate shearing edge wedges with a lug in the inlet half of the body. Ample gate length permits re-sharpening.



Bonnetless Design . . . 1) Two-piece body is bolted together and gasketed on a vertical centerline. 2) Stuffing box is an integral part of the body. 3) Packing and one-piece gland completely encompass gate.



Body Shearing Notches...Lower portion of the seat of the outlet half of the body is notched to better distribute the fibers of the pulp stock. This makes it easier for the gate to cut through fibrous material.

WALWORTH

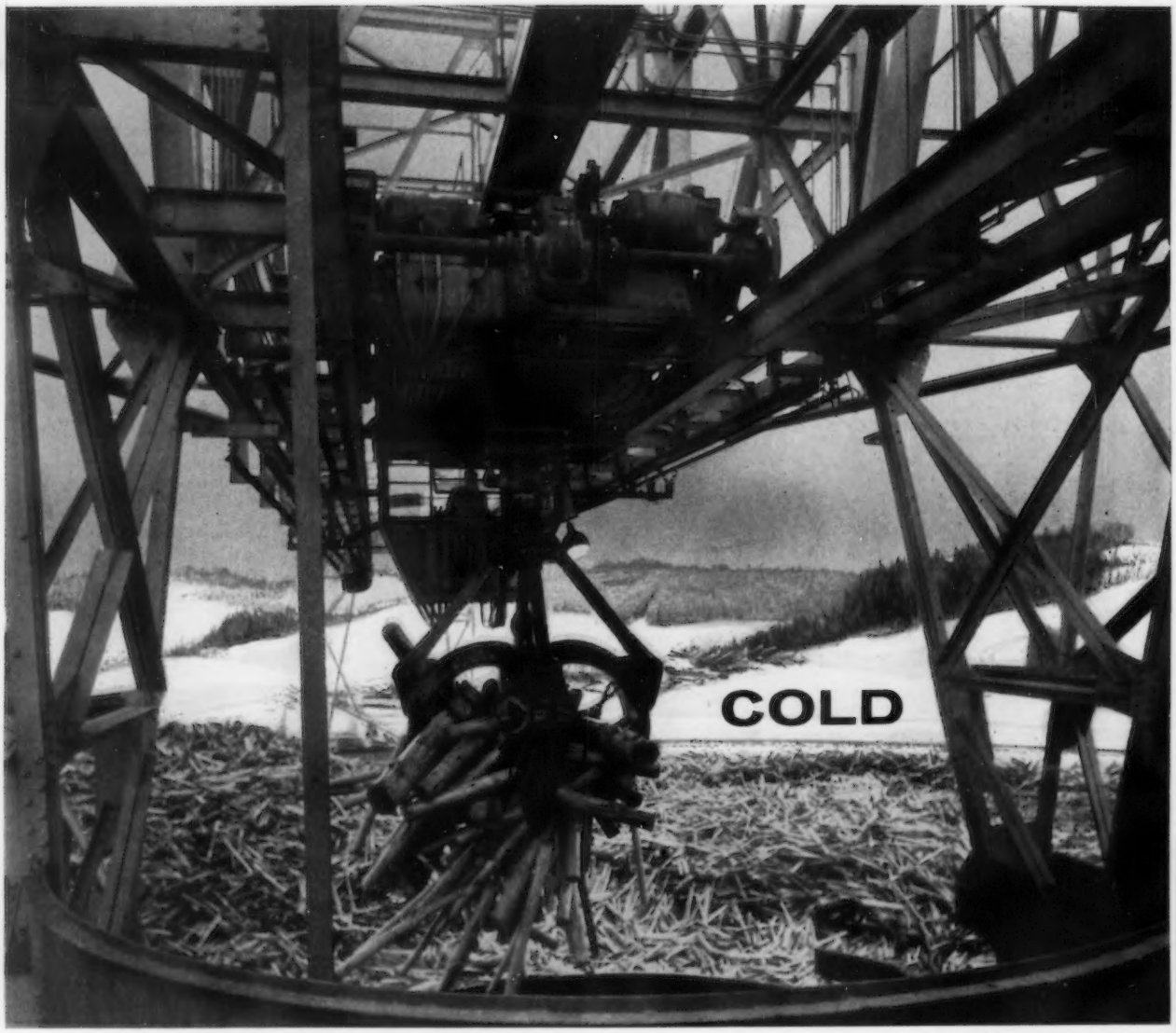
Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

New! Multi-purpose



Gulfcrown stands up to cold. It pumps easily in coldest weather at temperatures of 0°F. and below.

GULFCROWN Grease

does the work of many greases –withstands heat, cold, water

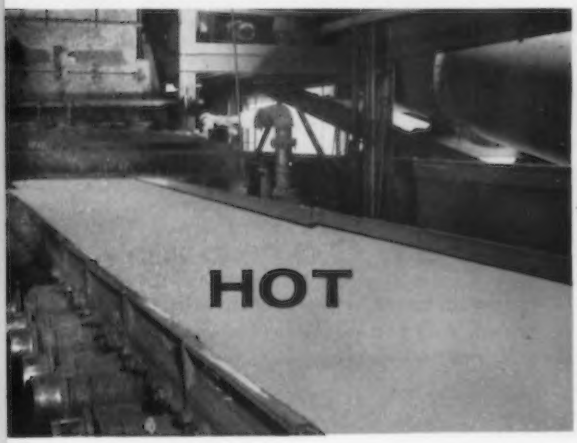
It's a fact—you can use Gulfcrown practically anywhere! On plain or antifriction bearings. In paper mills, textile mills, steel mills, power plants. Outside or inside. You name it, chances are Gulfcrown will lubricate it—but good! Operating conditions can be hot, cold or wet . . . this tough all-purpose grease does its job regardless.

You can see how one multi-purpose grease that does the work of many is a big money-saver. It reduces inventory, cuts lubricating costs and prevents application errors. Check the saving yourself—test Gulfcrown. Ask your Gulf sales engineer or write for free literature.

GULF

GULF OIL CORPORATION
1822 Gulf Building, Pittsburgh 30, Pa.

Gulfcrown resists heat. It won't get thin, won't run out of bearings even at 250°F.

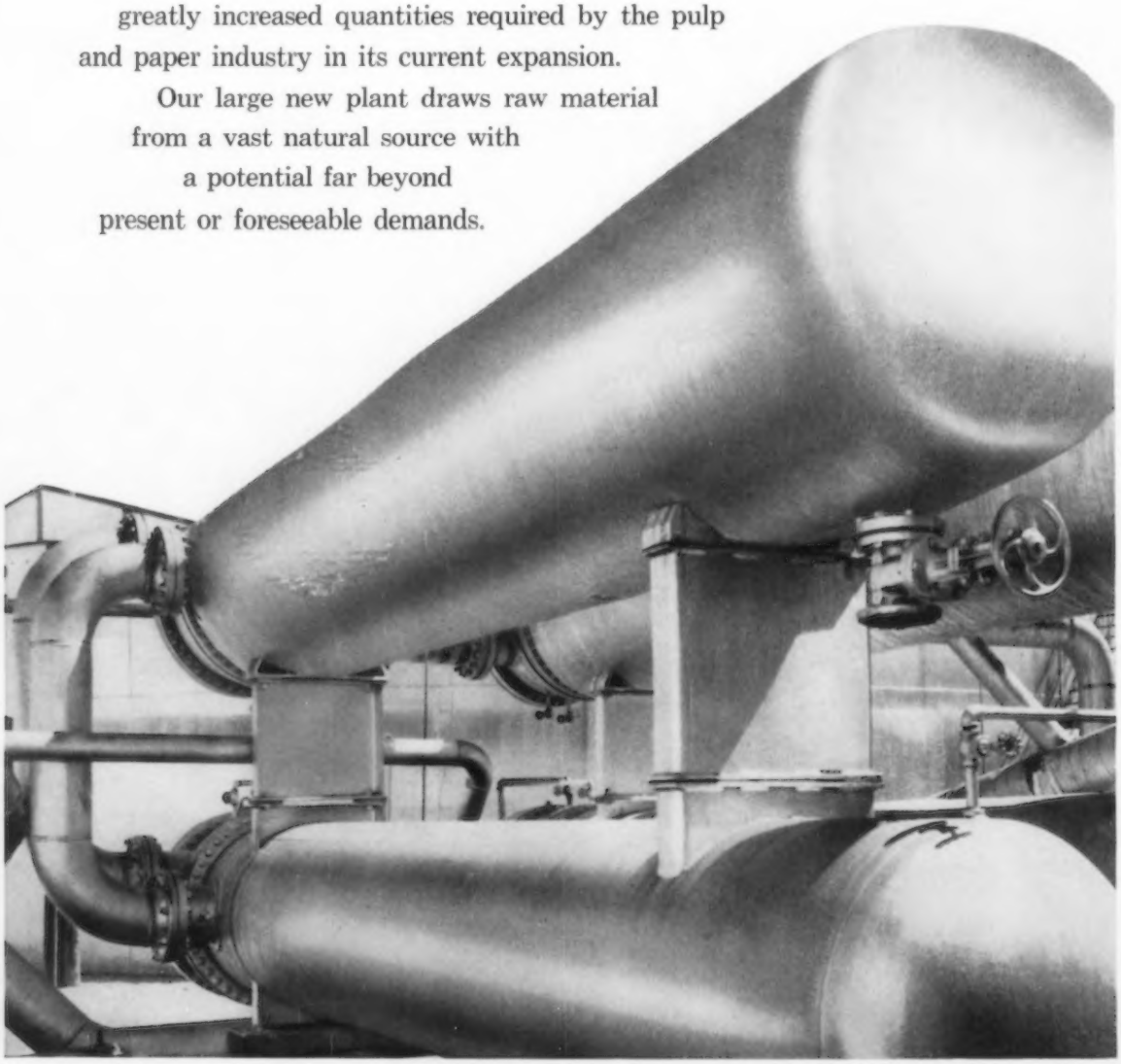


Gulfcrown sheds water—won't wash away. That's why it's a good rust preventive, too, under the dampest conditions such as this wet end of a paper machine.

SALT CAKE is a primary West End product and we have the production capacity to meet your needs

At West End, salt cake is a prime product . . . not a by-product . . . and is being produced in the greatly increased quantities required by the pulp and paper industry in its current expansion.

Our large new plant draws raw material from a vast natural source with a potential far beyond present or foreseeable demands.



WEST END

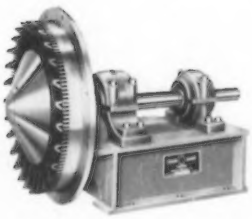
West End Chemical Company

DIVISION OF STAUFFER CHEMICAL COMPANY

EXECUTIVE OFFICES, 1956 WEBSTER, OAKLAND 12, CALIF. • PLANT, WESTEND, CALIF.

SODA ASH • BORAX • SODIUM SULFATE • SALT CAKE • HYDRATED LIME

MORDEN



Model C "Slush-Maker" pulping unit

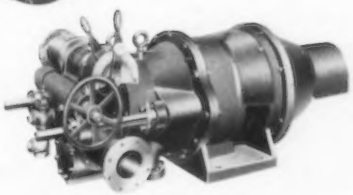
Around the world, the

"Slush-Maker" Type D continuous dry end

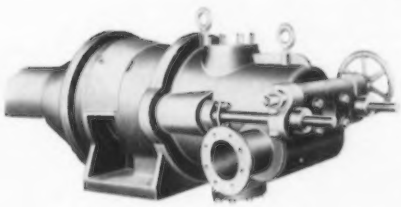
name "Morden"

"Slush-Maker" Type A batch or continuous

stands for specialists

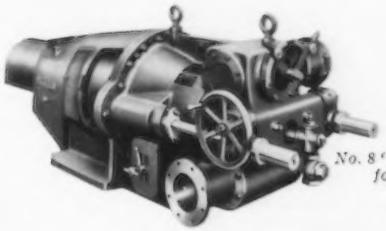


No. 6 "Stock-Maker" for beating



"Stuff-Maker" for jordaning

in quality and in service.



No. 8 "Stock-Maker" for beating

Send for your copy of the Morden Catalog, and ask for an in-the-mill discussion of your stock preparation requirements.

MORDEN MACHINES COMPANY

3420 S. W. MACADAM AVENUE, PORTLAND, OREGON

UNITED STATES REPRESENTATIVES — Midwest: Dan B. Chapman, Appleton, Wis.; Northeast: Orton Corporation, Fitchburg, Mass.; South: Brandon Sales, Greenville, S. C.

CHEMICAL PROGRESS WEEK-APRIL 8-12

ubiquitous chemicals

Where needed, when needed—maximum dependability of chemical supply is best assured by a multi-plant set-up. It smooths out local shortages and surpluses . . . assures you of shipments on schedules that meet your most exacting requirements.

Olin Mathieson's imaginative approach to the logistics of the chemical process industries plus a multi-plant system produces results. See how the flexibility of our rail, water, and highway transportation facilities can precisely serve your operations . . . call an Olin Mathieson representative today.

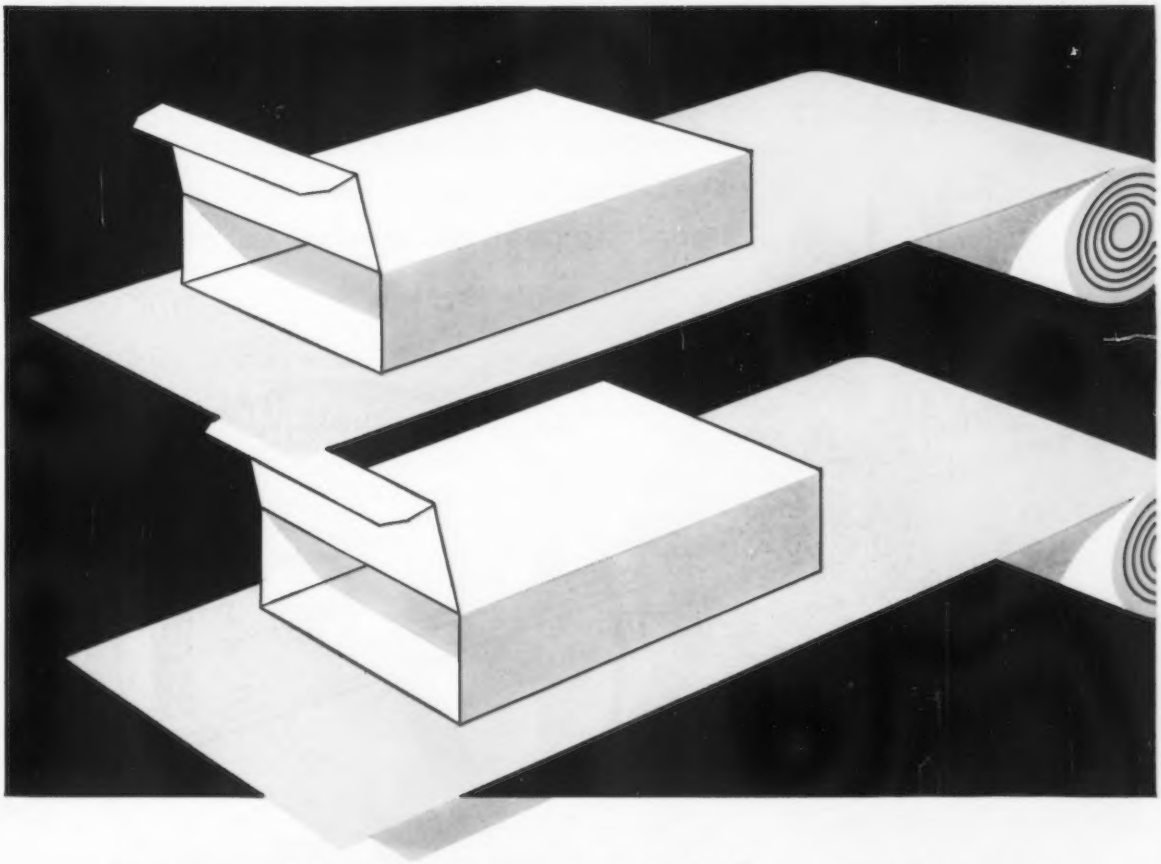
MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

MATHIESON

INORGANICS: Ammonia • Bicarbonate of Soda • Carbon Dioxide • Caustic Potash • Caustic Soda • Chlorine • Hydrazine and Derivatives • Hypochlorite Products Muriatic Acid • Nitrate of Soda • Nitric Acid • Soda Ash • Sodium Chlorite Products • Sulphate of Alumina • Sulphur (Processed) • Sulphuric Acid • **ORGANICS:** Ethylene Oxide • Ethylene Glycols • Polyethylene Glycols • Glycol Ether Solvents • Ethylene Dichloride • Dichloroethylether • Formaldehyde • Methanol • Sodium Methylate Hexamine • Ethylene Diamine • Polyamines • Ethanolamines • Trichlorophenol

4688

For your food products customers—



A new and better way to protect flavor and aroma

IONOL® C.P. antioxidant

ONE OF THE most serious threats to the quality of many food products is rancidification, which damages both flavor and aroma. Now, Ionol, C.P. antioxidant provides an *effective new way* to solve this troublesome problem . . . one that will be welcomed by manufacturers of baked goods, cereals, meals, shortening, packaged meats, butter, and similar products.

Ionol, C.P. antioxidant—*incorporated into boxboard or wrapping materials in which products are packed*—protects against rancidity by preventing oxygen attack on fats right where it starts—at the surface of the carton and wrappers.

In actual tests, baked goods were stored at 85° F. in Ionol, C.P.-impregnated boxboard cartons, which were found to be free of rancidity at the end of ninety days. Without Ionol, C.P.-antioxidant protection, packages of baked goods stored under similar conditions often develop rancidity within a week.

Be among the first to offer your customers this new effective packaged foods protection. Write for the technical bulletin: "Ionol, C.P. for Impregnating Paper and Paperboard."

SHELL CHEMICAL CORPORATION

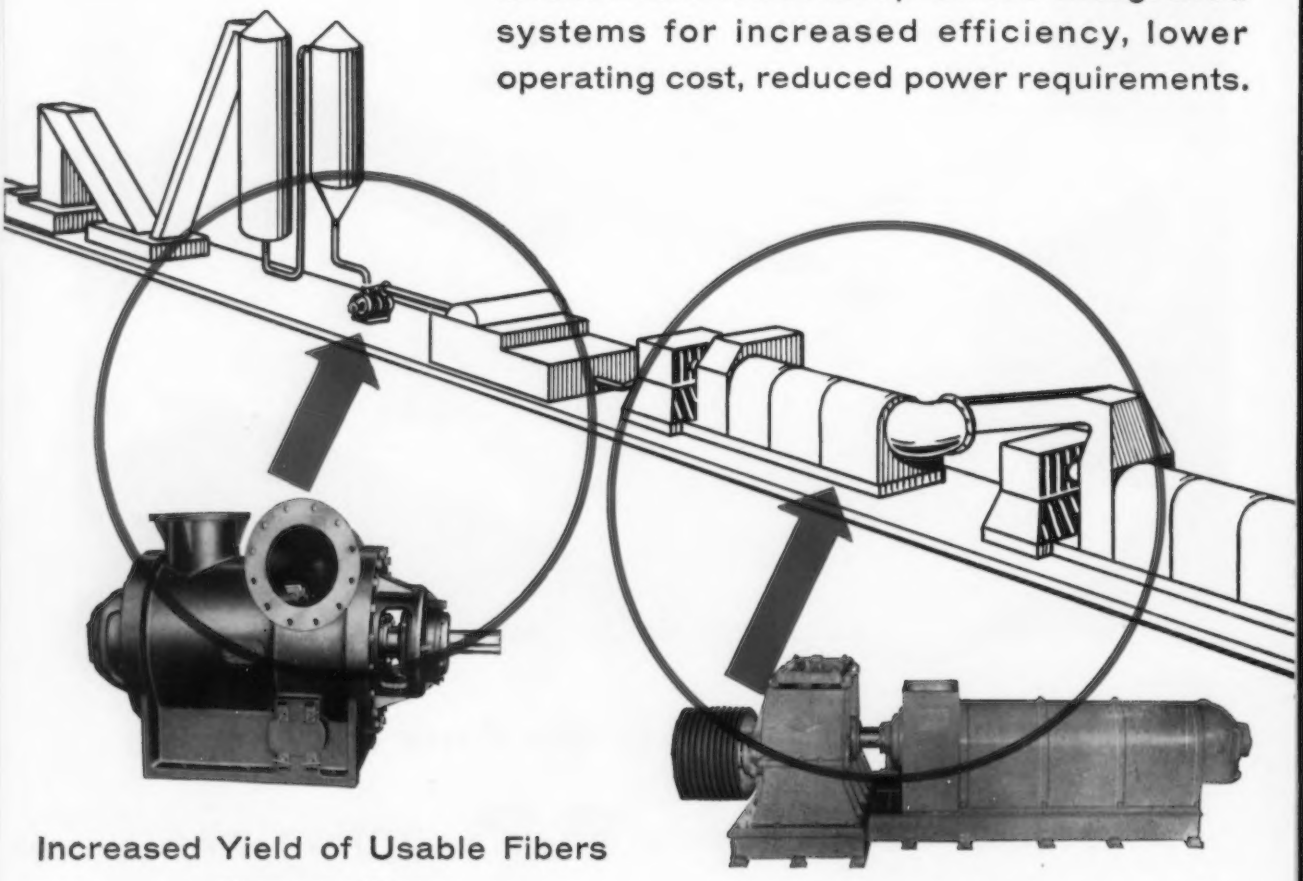
CHEMICAL SALES DIVISION, 380 Madison Avenue, New York 17, New York

Atlanta • Boston • Chicago • Cleveland • Detroit • Houston • Los Angeles • Newark • New York • San Francisco • St. Louis
IN CANADA: Chemical Division, Shell Oil Company of Canada, Limited • Montreal • Toronto • Vancouver

SHELL

SUTHERLAND PROCESSES

Sutherland leadership offers integrated systems for increased efficiency, lower operating cost, reduced power requirements.



Increased Yield of Usable Fibers —Cleaner Sheet

Continuous Defibering System installed between blow tank and washers for broke, cooked chips, waste paper cooked hard or soft, wood, or straw. The Sutherland Breaker Trap is the only equipment designed specifically to separate bundles of fibers. The Breaker Trap removes tramp metal and so protects both itself and subsequent equipment. It leaves intact other waste materials like cellophane, dirt particles, polyethylene, foil, rubber bands, wood slivers, etc., so that they may be removed by standard screening methods. The Sutherland Breaker Trap offers increased yield of usable fibers, decreases screen loss, improves washing efficiency, reduces power needs.

Savings in Chemicals, Heat, Water, Power, Space

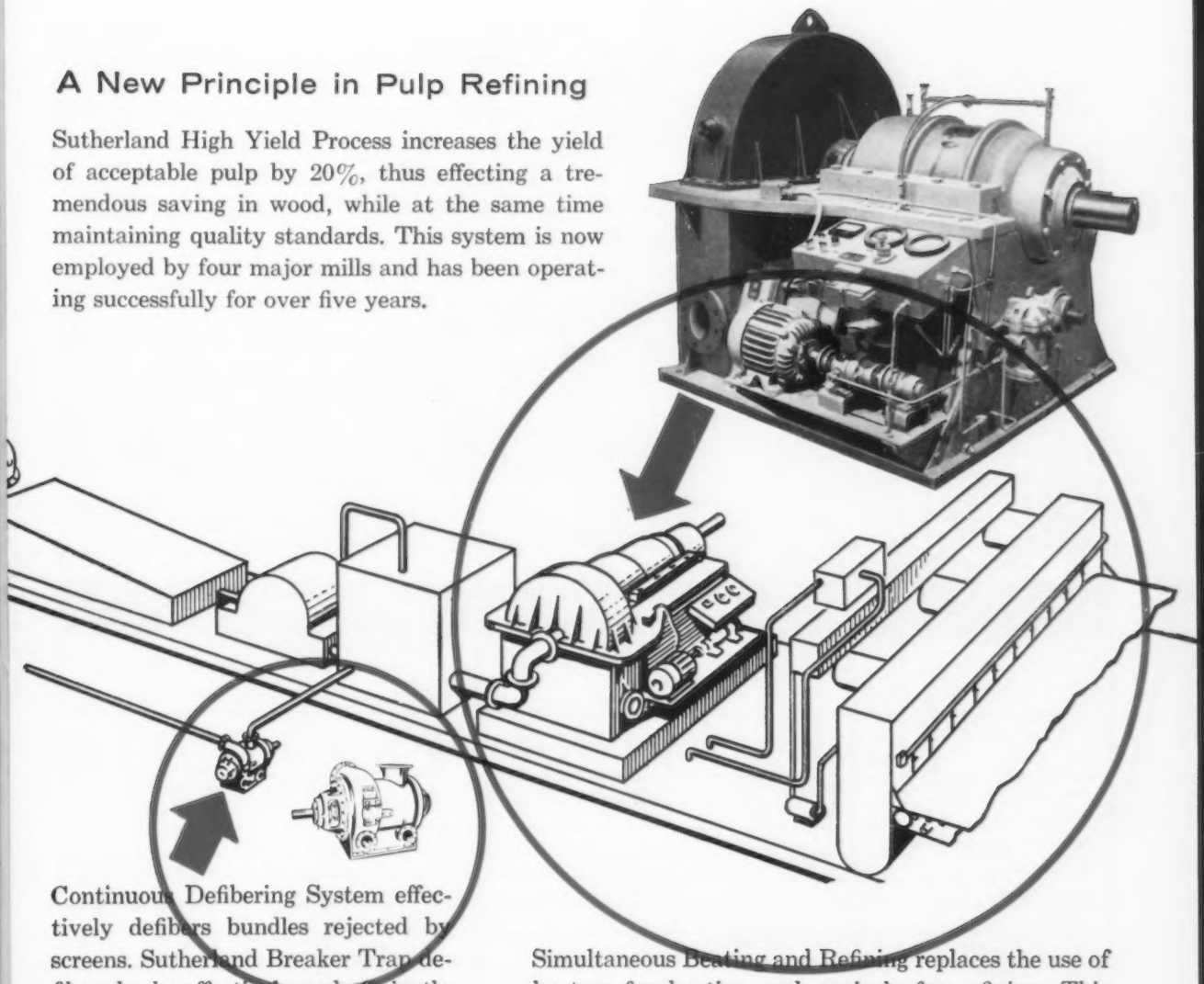
Pressure Washing System squeezes the liquor from the fibers and in doing so twists the fibers, thus increasing the felting power of the pulp and, therefore, the strength of boards and papers made from the same. The recovery of salt cake is excellent and the system has distinct advantages over other methods of washing. Another advantage lies in controlled water consumption and consequently effluent to the stream. In some cases pollution of the stream, into which the final discharge is made, is lowered so that the stream B.O.D. can pass State authority.

HAVE HIGHEST QUALITY PULP PRODUCTION

The Sutherland Standard is becoming the Standard of the Industry

A New Principle in Pulp Refining

Sutherland High Yield Process increases the yield of acceptable pulp by 20%, thus effecting a tremendous saving in wood, while at the same time maintaining quality standards. This system is now employed by four major mills and has been operating successfully for over five years.



Continuous Defibering System effectively defibers bundles rejected by screens. Sutherland Breaker Trap defibers broke effectively and efficiently and maintains pulp quality while increasing yield by reducing number of rejects.

Simultaneous Beating and Refining replaces the use of beaters for beating and conicals for refining. This simultaneous system has been in use for twenty years on all kinds of pulp and board and paper including white papers made of various furnishes.

THE SUTHERLAND GROUP

Trenton, New Jersey

Sutherland Refiner Ltd., Montreal, Canada

Sutherland Refiner Corp., Trenton, New Jersey
Sutherland Incorporated, Trenton, New Jersey

Sutherland International Ltd., Nassau, Bahamas

NOPCO OFFERS 21 WAX SIZES

to give your paper every combination of properties you want

Nopco Wax Sizes perform at least 4 important functions to help you make high quality paper and board that will give you an edge in today's highly competitive market.

1. Improve those properties which are difficult or impossible to obtain with rosin sizes.

2. Lower your sizing *costs* by replacing 30% to 50% of rosin size.

3. Improve the sizing of fortified rosin sizes.

4. Enhance the surface qualities of your paper and board, when used either alone or in conjunction with starch or other film-forming materials.

With any of these sizes goes the skilled counsel and wide experience of Nopco's paper technicians. They will welcome the opportunity to work with you on the toughest problems you have. Write today for their recommendations.
Nopco Chemical Company, Harrison, N. J.

NOPCO WAX SIZE SELECTOR CHART

	All Wax Acid Stable Nopco 1055 Series										Rosin-Wax Acid Stable Nopco 1155 Series				All Wax Alkaline Stable Nopco 1255 Series			Nopco Special Series			
	A	B	C	F	K	L	M	N	W	X	A	B	C	L	A	M	X	1245A	2252	KKE	KKE-1
Improved Finish	✓	✓	✓		✓	✓		✓		✓	✓				✓		✓	✓	✓		
Improved Fold	✓		✓				✓			✓					✓	✓	✓		✓		
Improved Calender Staining	✓									✓					✓		✓				
Oil Resistance							✓						✓			✓				✓	✓
Ink Resistance		✓	✓							✓		✓		✓			✓	✓	✓	✓	
Blood Resistance		✓					✓			✓				✓			✓	✓	✓		
Lactic Acid Resistance				✓				✓					✓								✓
Hot Liquid Resistance								✓					✓								✓
Grease Resistance		✓	✓				✓			✓											
Scuff Resistance		✓	✓				✓		✓	✓		✓	✓								✓
Printing Qualities	✓	✓			✓					✓	✓	✓	✓		✓		✓		✓	✓	
Starch Coating Lubricant	✓				✓	✓				✓					✓		✓	✓	✓		
Decrease Fuzz	✓	✓				✓				✓					✓		✓	✓	✓		

1907–1957 50 Years of Progress in Chemistry

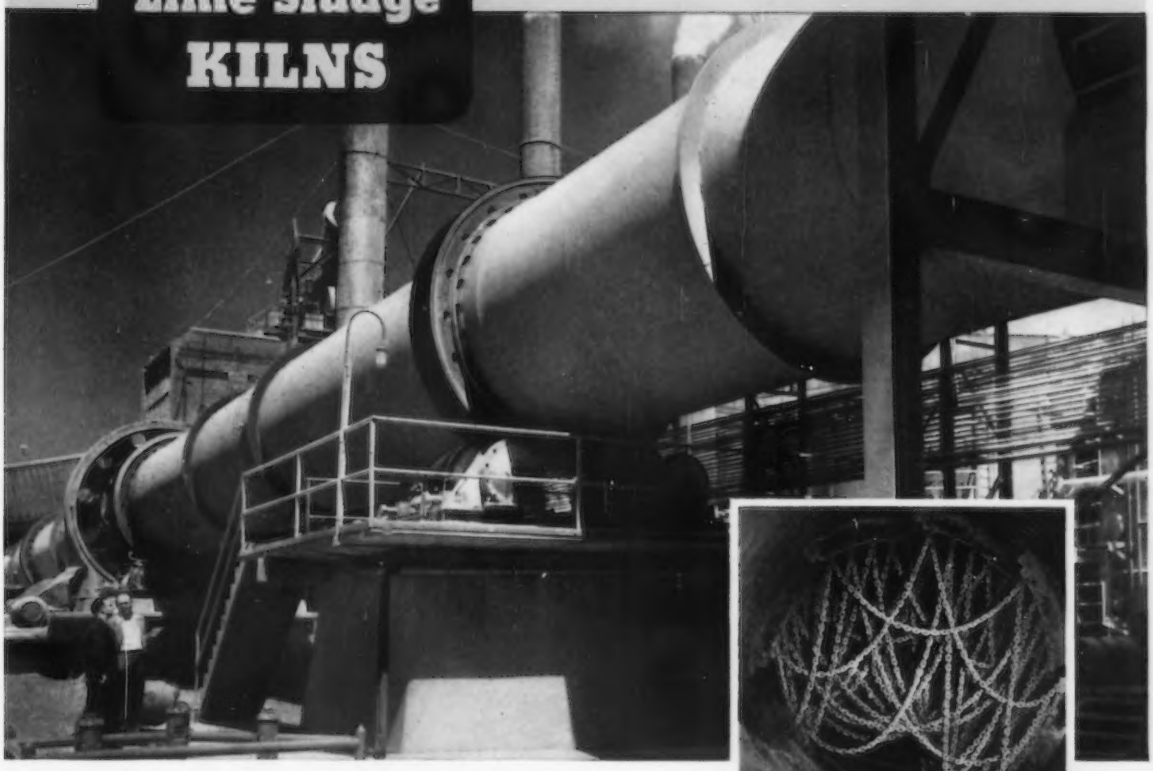
NOPCO

PLANTS: Harrison, N. J. • Cedartown, Ga.
Los Angeles, Richmond, Calif. • London, Canada

ALLIS-CHALMERS

Lime Sludge KILNS

One of two Allis-Chalmers 10½ by 265-foot lime sludge kilns at an unbleached sulphate pulp mill.



Heat-Recuperating System...

Cuts Fuel Requirements 40%

A patented chain-hanger arrangement in the Allis-Chalmers lime sludge kiln makes possible some rather remarkable savings in fuel consumption. With this heat-recuperating system in the feed end of the kiln, accelerated drying is accomplished in three ways:

1. By direct transfer from chains. (Chains hang in hot gases.)
2. By lifting material into path of hot gases.
3. By directing flow of gases over sludge bed under suspended chains.

The effectiveness of the system is reflected in the fact that fuel requirements drop as much as 40% when an Allis-Chalmers chain system is installed in a kiln.

Other advantages of this efficient use of heat — capacity increases ranging up to 10% and a substantial reduction in dust loss.

You'll find your savings are multiplied when you use an Allis-Chalmers lime sludge kiln. For more information, see your nearby A-C representative, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin. Ask for Bulletin 07B7010.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5212

Mead customers never face pulp problems

Vast forest reserves and the resources of eight great mills make Mead the dependable source of pulp supply.

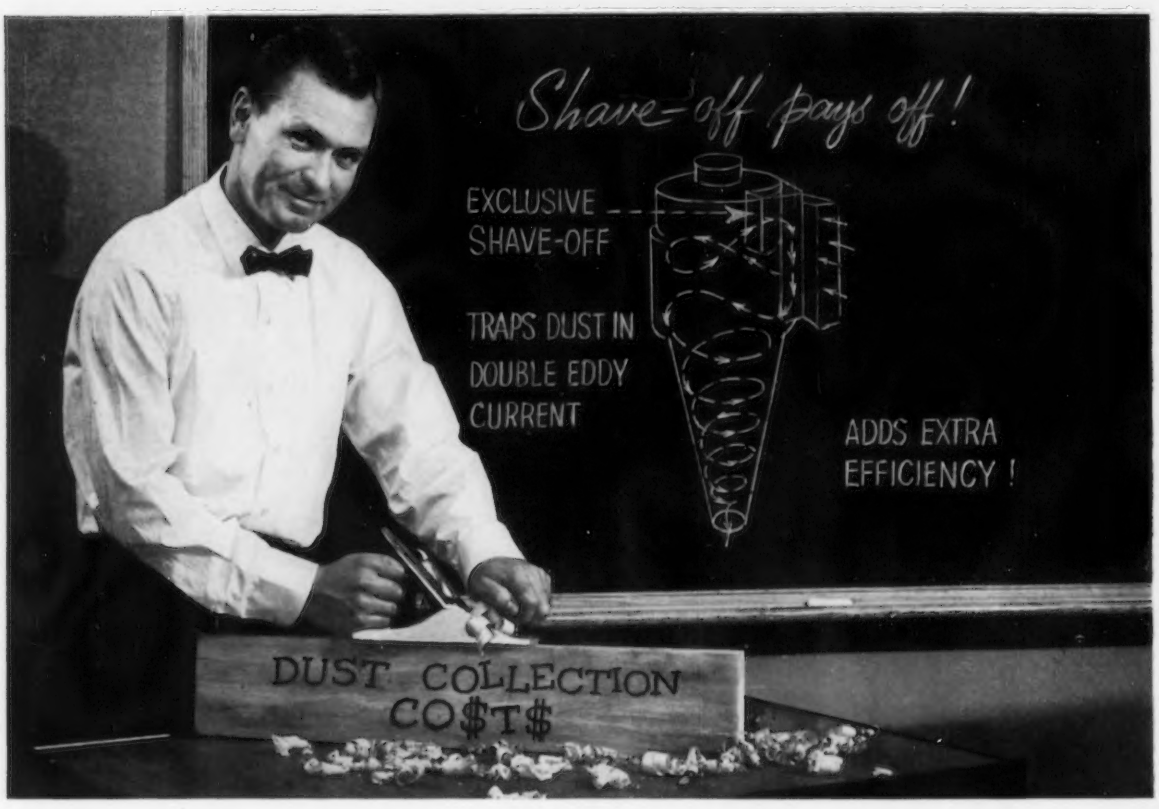
Mead's modern and extensive research facilities, plus Mead's devotion to the importance of quality, are extra insurance that the pulp you buy meets or exceeds any standard.

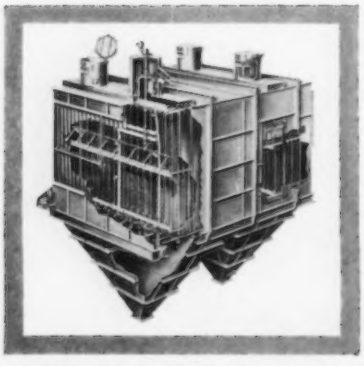
Whether your pulp requirements are chemical or mechanical, hardwood or soft wood, bleached or unbleached, our representative will be glad to call on you. He'll show you why Mead customers never face pulp problems.

MEAD *pulp*

MEAD PULP SALES, INC.
Distributors of Wood Pulp
Bleached and Unbleached Chemical and Mechanical Wood Pulp
230 Park Avenue, New York 17
20 North Wacker Drive, Chicago 6
118 West First Street, Dayton 2
1504 Sherbrooke Street, West, Montreal, Canada

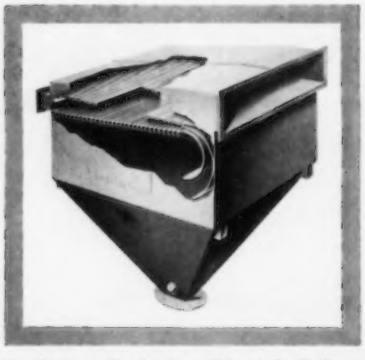
How Buell's exclusive Shave-off pays off in extra dust collection efficiency





Buell SF Electric Precipitator also delivers extra dust collection efficiency, due to unique Spiralectrodes and Continuous Cycle Rapping.

Proper proportioning, side entry of dust-laden gases, add even more extra efficiency and long, maintenance-free life to Buell Cyclones. Large diameter design eliminates bridging and clogging, keeps efficiency high under varying loads.

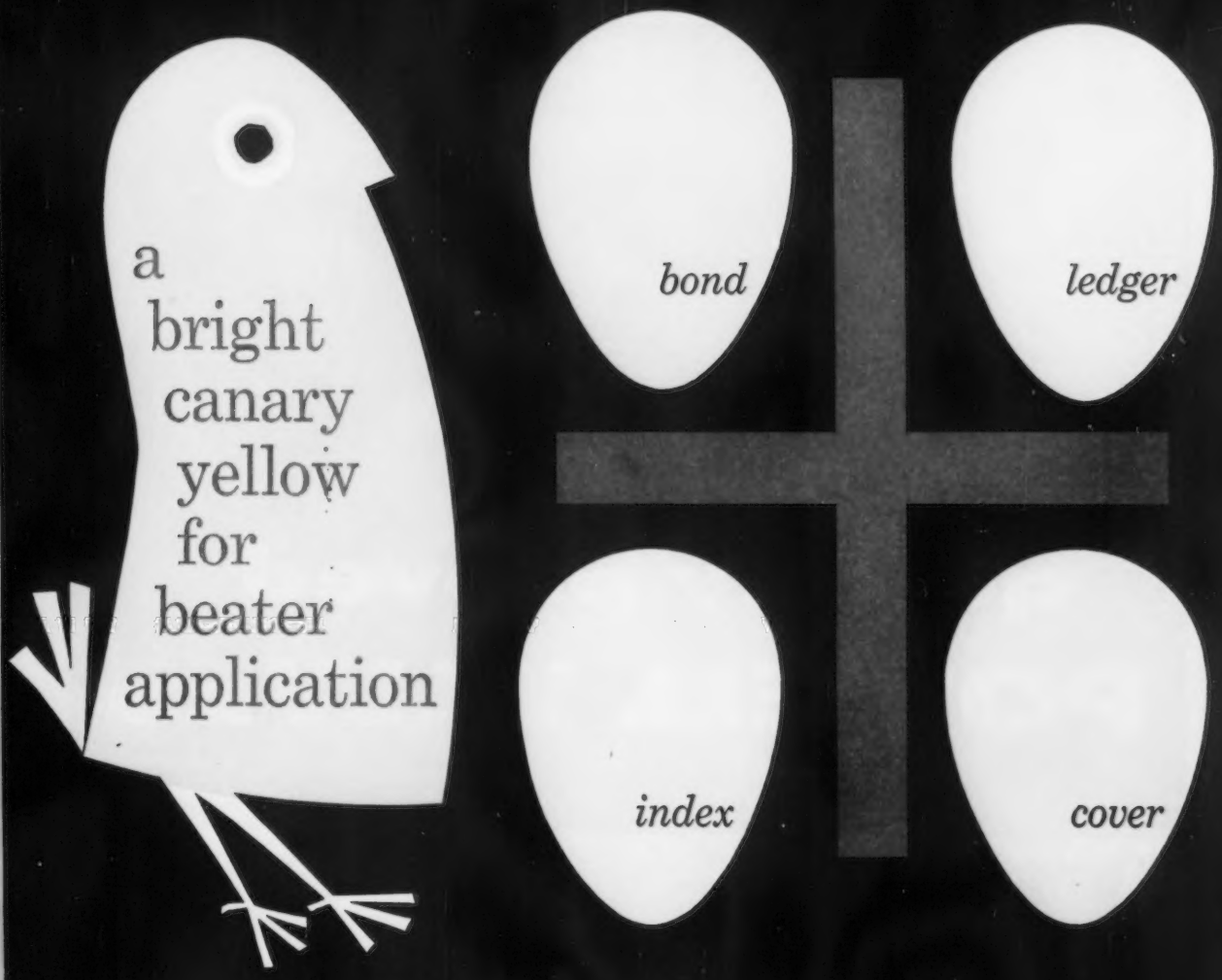


Buell Low Resistance Fly Ash Collector combines top efficiency with low draft loss, for either natural or mechanical draft installations.

For more specific data about Buell's *extra efficiency*, write Dept. 49-D
Buell Engineering Company,
70 Pine Street,
New York 5, N. Y.

buell®

MECHANICAL ELECTRICAL *Experts at delivering Extra Efficiency in* **DUST COLLECTION SYSTEMS**



Brilliant Pure Yellow 6GS Extra Conc.

A nondusting acid dye for bond, ledger, index and cover papers

Brilliant Pure Yellow 6GS Extra Conc. may be added dry to the beater without danger of color specks. It produces bright, clear yellows with good fastness to light and very little two-sidedness.

In combination with other dyes and pigments, especially with bright blues to obtain greens, Brilliant Pure Yellow 6GS Extra Conc. acts as a fast-to-light component. Extra advantages include less tendency to burn out on contact with hot dryers, and cleaner backwaters.

Brilliant Pure Yellow 6GS Extra Conc. is only one of many dependable, easy-to-use paper dyes available from GDC. Please write or call us for information concerning these dyes or any paper dyeing problem you may have.

From Research to Reality

gdc gaf

GENERAL DYESTUFF COMPANY

A SALES DIVISION OF

GENERAL ANILINE & FILM CORPORATION

435 HUDSON STREET • NEW YORK 14, NEW YORK

BOSTON · CHARLOTTE · CHATTANOOGA · CHICAGO · LOS ANGELES · NEW YORK · PHILADELPHIA · PORTLAND, ORE. · PROVIDENCE · SAN FRANCISCO IN CANADA: CHEMICAL DEVELOPMENTS OF CANADA, LTD., MONTREAL

Brilliant Pure Yellow 6GS Extra Conc. manufactured by the General Aniline and Film Corporation is sold outside the United States under the trademark "Fenazo Yellow XP."

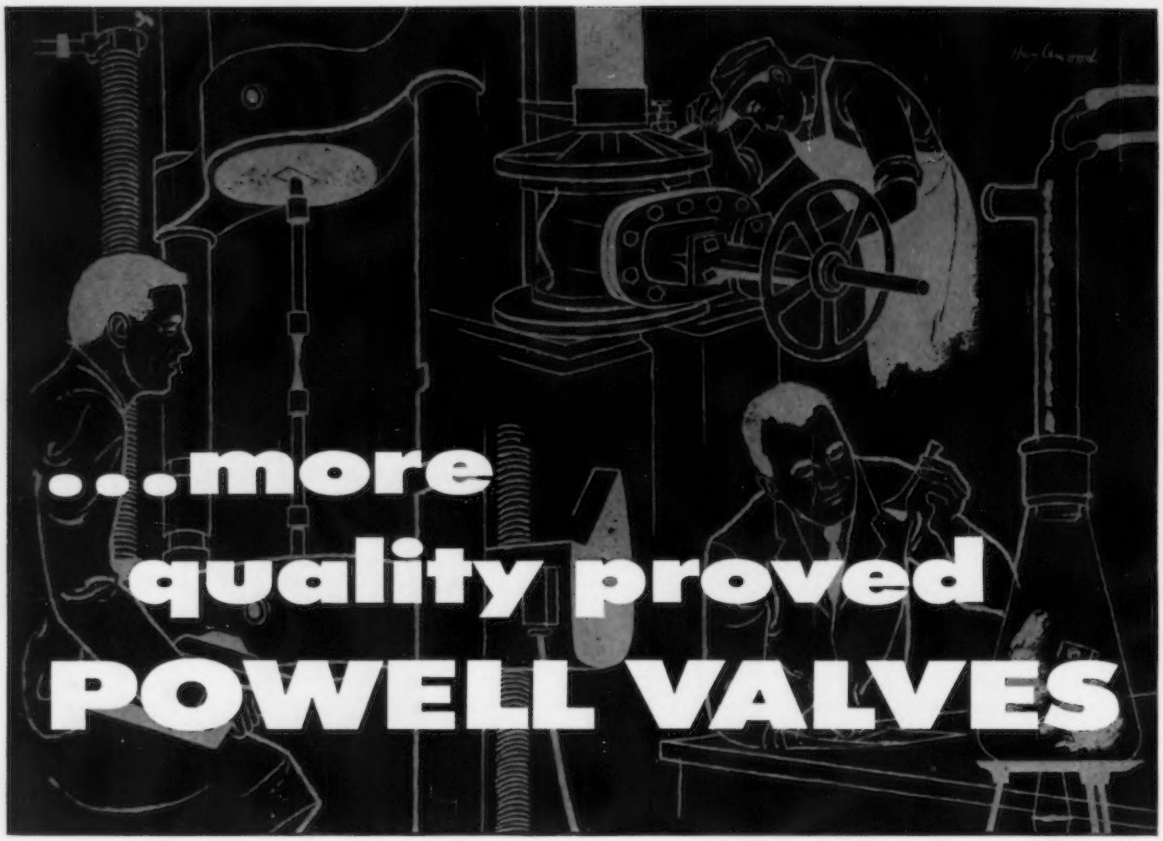


FIG. 2309—Flush Bottom Tank Valve for 150 Pounds W.P.

FIG. 2491—Stainless Steel O.S.& Y. Gate Valve for 150 Pounds W.P.

FIG. 1886—Stainless Steel Liquid Level Gauge for 350 Pounds W.W.P. Offset pattern.

FIG. 2107—Stainless Steel "Y" Valve for 150 Pounds W.P.

for dependable flow control

Consult your Powell Valve distributor for full facts about quality proved bronze, iron, steel and corrosion-resistant valves. For every flow control problem—there is a Powell Valve to solve it.

THE WM. POWELL COMPANY, CINCINNATI 22, OHIO . . . 111th YEAR

This underwater photo dramatically illustrates speedy dispersbility of new Dow Corning Antifoam B.

Question: What about the Cost of using new Antifoam B?

NEW Silicone Defoamer

ANTIFOAM B

gives you the ultimate in foam-killing convenience

fast acting
New Dow Corning ANTIFOAM B disperses immediately in aqueous solutions. No stirring or agitation required.

ready to use
Just add "as is." No delays for diluting or mixing. No need for extra containers.

lasts longer
Will not oil out, plate out, settle or precipitate in most applications. Less tendency to spot textiles during processing. Ideal for continuous processing.

stable
Long storage life—stays uniform even if frozen or boiled. Retains effectiveness after sterilization.

test
ANTIFOAM B at no expense . . . Write, wire or phone today for a generous FREE SAMPLE and full particulars.

Answer: It's the lowest priced silicone defoamer available...

and you get all these *extra* advantages

Have you tried Antifoam B?

IT'S BETTER . . . IT COSTS LESS

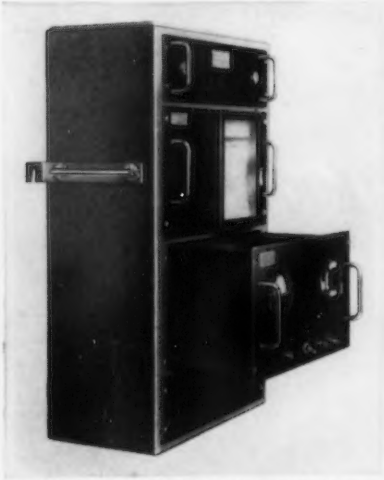
Write today for FREE sample and prices

DOW CORNING SILICONES

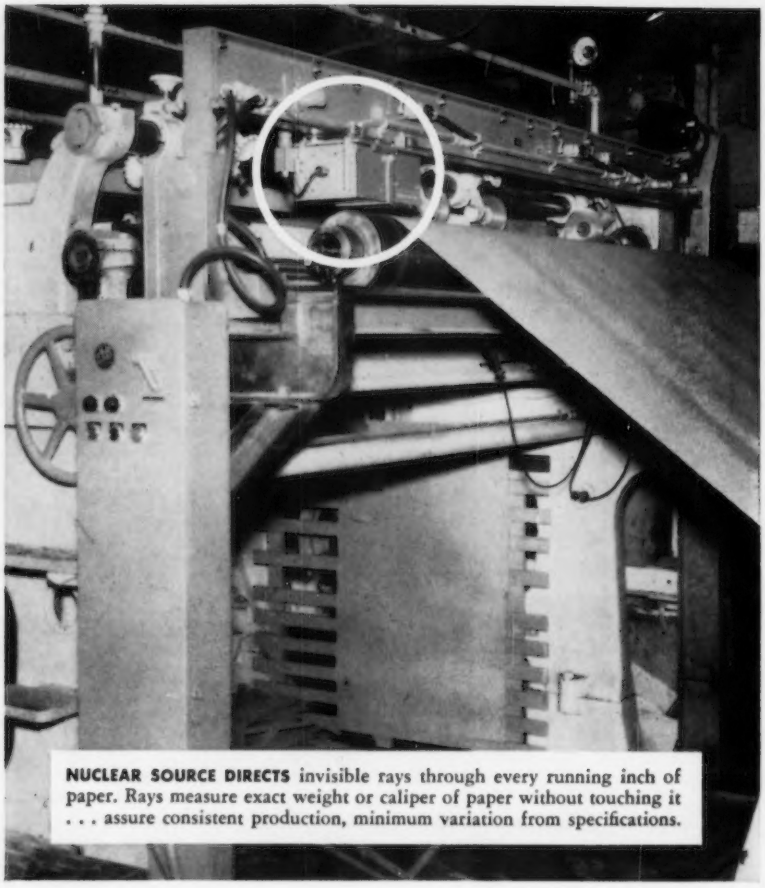
ADDRESS DEPT. 2916a

DOW CORNING CORPORATION
MIDLAND, MICHIGAN
first in silicones

MACHINE TENDER adjusts target selector to proper weight specification for each order. Selector acts as constant guide for tender stationed at wet end.

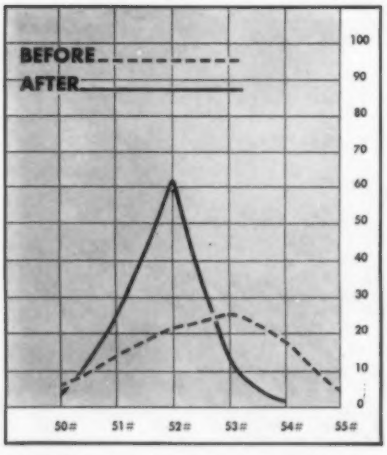


EXCLUSIVE CONSOLE RECORDER features drawer-type construction for easy maintenance. Continuous recorder charts weight of paper during production, provides permanent record.



NUCLEAR SOURCE DIRECTS invisible rays through every running inch of paper. Rays measure exact weight or caliper of paper without touching it . . . assure consistent production, minimum variation from specifications.

NOW . . . HUG WEIGHT SPECIFICATIONS with Curtiss-Wright Control Systems



BEFORE, when hand-weighed tear sheets were used for control, variation was excessive. After installing Curtiss-Wright system, uniformity sharply increased.

Field-proven Curtiss-Wright Basis Weight Control Systems monitor paper weight continuously, record actual production quality, warn immediately if variations occur—even trigger stuff gate controls. The result is roll after roll of on-weight paper, with important savings in production time, pulp and down-grading losses. Order changes can be made faster, and cross-sheet variation reduced as much as 50%. The large choice of mounting designs permits an installation tailored to your space requirements and budget. *For complete details, write Industrial Controls Dept., Curtiss-Wright Electronics Division, Carlstadt, N. J.*

WEST COAST REPRESENTATIVE:
Western Dynamics Co., 444 Dexter Horton Bldg., Seattle 4, Wash.

CANADIAN REPRESENTATIVE:
Electronics Associates, Ltd., 4616 Yonge St., Willowdale, Ont.

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ELECTRONICS DIVISION
CURTISS-WRIGHT
CORPORATION • CARLSTADT, N. J.

When food looks this good, it must taste good. Your customers can rely on high-fidelity, color-true reproduction like this with paper processed with Glidden Alpha Protein. *(Photo courtesy Durkee Famous Foods.)*

Appealing Reproduction...

SHOWN ON PAPER PROCESSED WITH GLIDDEN ALPHA® PROTEIN

Manufacturers of all grades of printing papers turn to Glidden *Alpha Protein* as a coating adhesive for on and off-machine coating, to improve the finished product and reduce production costs. *Alpha Protein* offers controlled uniformity, price stability, cleanliness, and many production advantages.

FOR OFF-MACHINE COATING . . . Compatible with the various mineral substances in the coating, *Alpha Protein* binds them firmly to the base stock. *Alpha Protein* coating dries rapidly, gives excellent finish on calendering.

FOR ON-MACHINE, HIGH SOLIDS COATING... Extra solids in *Alpha Protein* coatings result in production increases up to 15%. More solids mean less drying time, higher machine speeds, higher coat weights. *Alpha Protein* helps to improve opacity and whiteness, and makes possible smoother, more uniform paper. *Alpha Protein* machine-coated papers are currently being produced that are comparable in quality to costlier conversion-coated types.

The knowledge, skill and pilot-testing equipment of Glidden Technical Service have helped many manufacturers improve quality, speed production and reduce costs with *Alpha Protein.* Call or write for details.

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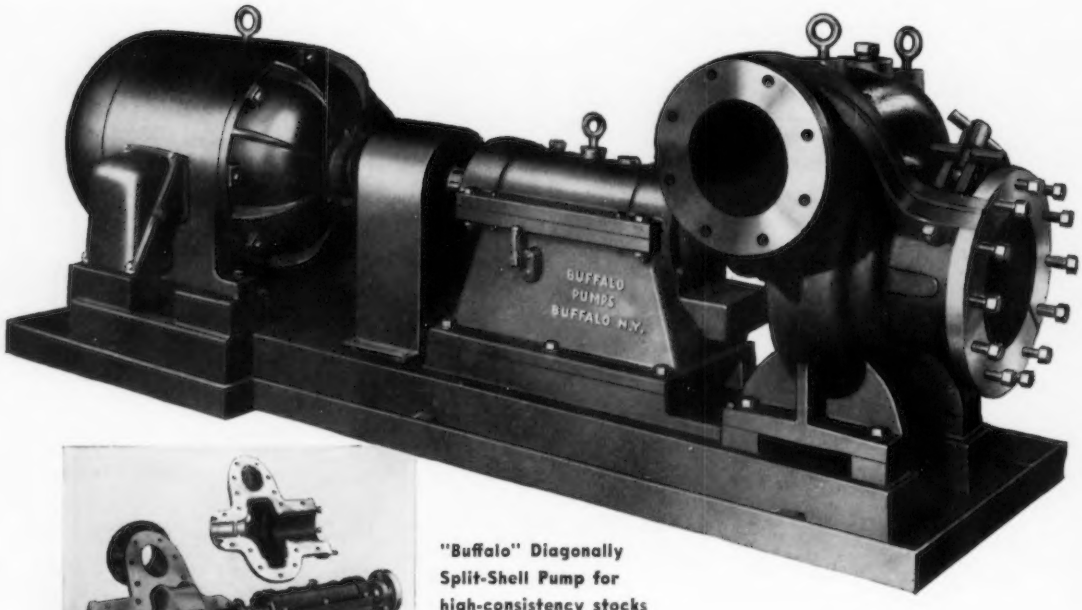
CHEMURGY DIVISION

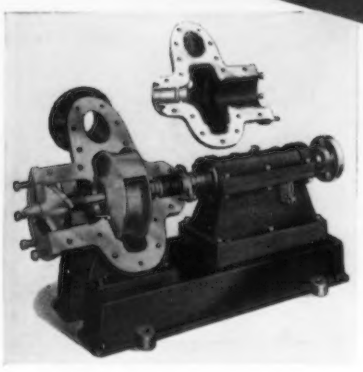
The Glidden Company

1825 N. Laramie Avenue • Chicago 39, Illinois

QUALITY Glidden PRODUCTS

Yes—it costs more to build but FAR LESS TO RUN





"Buffalo" Diagonally Split-Shell Pump for high-consistency stocks

"Buffalo" Diagonally Split-Shell Pump with booster screw impeller for high consistency stock with low submergence. Note easy access to impeller and stuffing box.

Yes, all parts of "Buffalo" paper Stock Pumps are deliberately oversize, because from our many years of working with the paper industry, we know what a pump must have to operate economically, year after year. First, the overall strength to stay on the job. Second, the accessibility to make maintenance simple and fast. Third, efficiency that will be reflected in your power bills. And fourth, a broad line to give you the *best* pump for the job.

All these factors, while they add to the cost of building "Buffalo" Paper Stock Pumps, make up the "Q" Factor* that multiplies your operational savings through the years. This *major* economy of operation is the reason why "Buffalo" is the choice of paper firms everywhere. Write for Bulletin 953-J for the engineering details on this complete line of pumps "Custom-made" for the paper industry.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

BUFFALO PUMPS
DIVISION OF BUFFALO FORGE CO.
159 Mortimer St. Buffalo, N. Y.
Canada Pumps, Ltd., Kitchener, Ont.
Sales Representatives in all Principal Cities

"Buffalo" PUMPS

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID

Now...

Three NEW Brands added to the *Mount Vernon* *Dryer Felt Family*

SIAMESE · TOUR BOSS · RAMESES

TO SERVE YOU BETTER—Mount Vernon's new Lawrence Mills Division in Lawrence, Mass., together with its Columbia Mills Division, now makes available *two* strategically located sources of supply from which to service your dryer felt needs—another step in Mount Vernon's continuing effort to provide the paper industry with the finest dryer felt service anywhere. Ask for these outstanding Mount Vernon brands:

From The Columbia Mills Division:

RICHLAND TRIPLEX heavy-duty, all-purpose dryer felts
WOODBERRY 887 reinforced dryer felts
RAYCORE 33 asbestos reinforced dryer felts
RAYCORE C-171 smooth-faced dryer felts
C-203 full-faced asbestos dryer felts

From The Lawrence Mills Division:

SIAMESE 135 general purpose duplex dryer felts
TOUR BOSS lighter weight duplex dryer felts
RAMESES extremely fine-faced dryer felts

PRE-STRETCHED—All Mount Vernon dryer felts are now available pre-stretched and pre-shrunk, with or without clipper seams.

UNIFORMITY Makes The Big Difference In Industrial Fabrics

Mount Vernon Mills, inc.
A LEADER IN INDUSTRIAL TEXTILES

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increased speed . . . increased production with STONITE® *wet press rolls*

High water removal and good sheet release at high operating speeds are achieved in the many mills with Stonite rolls by Stowe-Woodward. Developed especially for wet press positions, Stonite combines hardness and fine finish with amazing durability. Whatever your furnish, whatever your operating conditions, ask your Stowe-Woodward Sales Engineer about the many advantages of Stonite and other Stowe-Woodward rolls in your mill.

Complete roll processing plants at:
NEWTON UPPER FALLS, MASS.
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RUBBER ROLLS with a REPUTATION

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Paper Mill Operating Rates

Paper mill (excluding newsprint) operating rate in March was close to 96% compared with 103% for March 1956. Tonnage figures are not yet available but it is obvious that the spread in production for the two periods is not nearly so great as that for the operating rates due to considerable increase in capacity in the year between. For the first three months paper mill rates were a little below 95% compared with 101.3% for the same period last year.

U. S. and Canadian Pulp Shipments Off

U. S. pulp production in February declined 100,000 tons from the same month last year (any comparison with January of this year is meaningless because of the smaller number of working days), according to the U. S. Pulp Producers Assn. Greatest decline was shown by unbleached kraft, production of which was off 76,000 tons. Likewise February Canadian pulp exports were off from the same month of last year by 2.5%.

Folding Box Men Dogged

Quiet optimism combined with dogged determination to expand use for their products was the attitude prevalent among the box manufacturers at the Folding Box Assn. annual meeting last week.

Bright Future for Boxboard

Research developments indicate great forthcoming improvements in boxboard, the Folding Box Assn. was told at its annual meeting last week. In a luncheon address reported in this issue, Wm. Caddo of Gair painted a bright future for cylinder boxboard.

Number of Wage Earners Up One Million

Total available civilian labor force increased 800,000 in between March last year and March this year. The employed is one million more in March than it was last March, and the highest March on record. The number of unemployed is down. It is down from February and down from a year ago March. This is according to a Dept. of Commerce report issued this week.

Waste Paper Continues Drop

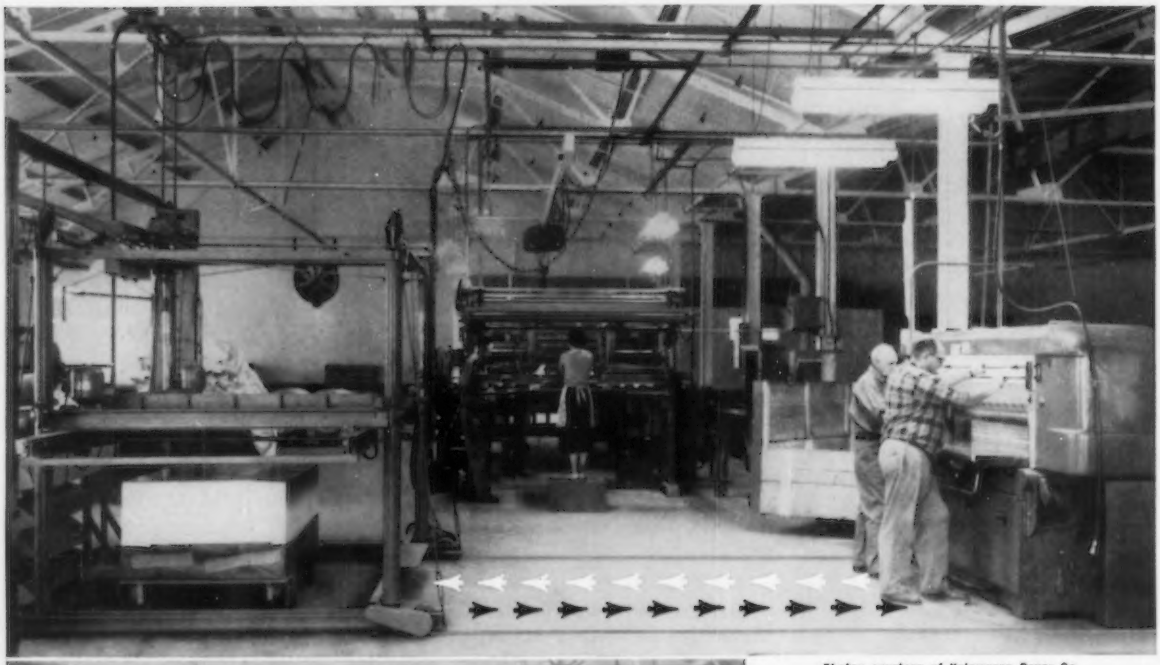
Waste paper prices continue to be very weak. In New York No. 1 mixed papers dropped to their lowest point in years.

Area for Paper Mill Savings

Possibilities of savings in manpower and increased employee output on the production side in most paper mills have been quite thoroughly realized. The one exception is finishing departments of those mills having extensive finishing operations. This week's issue carries an article on the highly efficient operation of a medium size paper mill.

New Fibers From Pulping Wastes

The continual research pressure to find new products from chemical pulping wastes is gradually paying-off. Latest development, reported in this issue, is Rayonier's announcement of a process to manufacture synthetic polyester fibers from sulphite pulping waste liquor.



Photos courtesy of Kalamazoo Paper Co.

* Patents applied for.

Mechanize Your Finishing Room with a Rice Barton Precision Sheet Piler*!

Developed by actual mill experience, the Rice Barton Precision Sheet Piler* gives you perfectly piled skids, doubles trimming and piling production without additional personnel, and eliminates the usual back-breaking effort.

Model 80 (shown) used in conjunction with an 85" trimmer piles a maximum sheet size of 79" x 55" to a height of 82" from the floor. Your Rice Barton representative can give you full details, or write direct to Rice Barton.

RICE BARTON

RICE BARTON CORPORATION

Worcester, Massachusetts

Paper Machine Builders Since 1837

West Coast Distributor: **Ray Smythe** . . 511 Park Building • Portland, Oregon

Another Sask. Pulp Mill Mooted

A second large pulp mill for northern Saskatchewan, opening up 12,000 square miles of virgin timber land, it is said will get under way this spring. Engineering work on the project, expected to cost up to $40 million is due to start shortly in the Meadow Lake area, 150 miles northwest of Prince Albert.

Last fall Vancouver business-man Robert Campbell announced a $60 million project northeast of Prince Albert. Construction is said to be scheduled to begin by June 1.

The scope of the new scheme was disclosed now by Saskatchewan Natural Resources Minister A. G. Kuziak when he confirmed signing of an agreement last September between Ellis E. Patterson and associates of Studio City, Calif., and the provincial government. Under the agreement, the group is given an option on 12,000 square miles of Crown owned spruce, fir, jackpine and popular forests. Construction of the mill, with a minimum production of 300 tons daily, would start before September 1.

Provision is also made for additional timber rights enabling later expansion to 600 tons daily or the construction of a second 300 ton pulp mill.

First Chips Unloaded At Georgia Pacific

The first car load of chips to be delivered to the new mill of Georgia Pacific Paper Co. were unloaded the last of March. The chips were produced locally and were sent to the mill to check chip handling equipment. Production of pulp is scheduled for January 1, 1958.

Investigate Four Sites For Tasmania Mill

Australian Newsprint Mills is investigating four sites in Tasmania for another pulp plant, and this project may involve a capital expenditure of about $45 million. New development will probably be carried out in two stages. (Present production is about 80,000 tons of newsprint a year).

NEW EDEN MILL of Whippany Paper Board Co., Whippany, N. J., which is due to begin production of paperboard on the world's largest cylinder machine this summer and on a new fourdrinier machine in the fall.

St. Regis Closes Carthage Mill

The St. Regis Paper Co. announced that it has terminated operations at its Carthage mill. "This decision has been reached because of the curtailment in the demand for the products made at that mill and it is the present intention of the management to make this permanent," said the announcement issued from the company's head office.

The mill, has operated on the production of a variety of grades of paper through the years and is at present manufacturing lightweight directory paper.

The mill is equipped with one 135-inch fourdrinier machine trimming 120 inches and producing about 45 tons of paper per day. Other equipment of the mill includes five jordans, a Hydropulper, and one Pulpmaster. It has water, steam and electric power. During the past decade or more the St. Regis Paper Co. has been making a number of grades of papers at different times in an effort to keep the plant in operation. Bag paper, bags and toweling have been produced.

The mill was originally that of the Champion Paper Co., organized late in 1901 with James A. Outterson the leading spirit behind it and first president of the company.

Weyerhaeuser-Kieckhefer Merger On

Plans to merge the Eddy Paper Corp., and the Kieckhefer Container Co., with the Weyerhaeuser Timber Co., have been approved by the directors of the three firms.

Eddy Paper and Kieckhefer would become a part of Weyerhaeuser through an exchange of stock.

The acquisition of Eddy Paper would involve more than 60 million dollars worth of Weyerhaeuser common stock, according to present market prices.

The stock exchange terms for Kieckhefer Container were not disclosed. Its stock is privately held.

Stockholders of the three firms will vote on the merger proposal at special meetings next month.

At one time Kieckhefer was a subsidiary of Eddy Paper. It currently is a separate firm, although it has a number of joint officers, directors and stockholders with Eddy Paper. John W. Kieckhefer is chairman of both firms.

For more details see Paper Trade Journal Feb. 11, 1957.

New Fiber From Pulp Mill Waste

Dr. Louis H. Bock and James K. Anderson of Rayonier Inc., have announced that their investigations into lignins, have yielded new polyester fibers "somewhat similar to those currently being marketed." They revealed that these synthetic fibers could be obtained from the lignin complex in sulphite pulp mill waste liquor.

The scientists reported that the new polyester fibers are based upon vanillin converted to protocatechuic acid, which also is obtainable from both the bark and the needles of the western hemlock.

They said that the new fibers revealed high tensile strength and melting points of 419° F, and also displayed good drying properties and very low water absorption. They added that these new polyesters, as yet un-named and still prossessing some "bugs," may be considered to be in a stage of development similar to nylon in the mid-1930's.

It was learned that Rayonier, as a basic raw material producer has no interest in producing the fiber, but might consider marketing the protocatechuic acid.

Bend Mill Plans Not Finalized

Freeman Schultz, general manager of Brooks-Scanlon, Inc., Powell River Co. subsidiary, reports that more definite plans regarding the new pulp mill to be built at Bend, Ore., may be expected in about two months. Four separate engineering plans are being submitted for approval and from these should emerge the final plan.

More About J-M's New Board Plants

Two new insulating board plants will join the Johns-Manville production line within the next several months, almost doubling manufacturing capacity in wood fibre products.

Located at North Bay, Ont., and Klamath Falls, Ore., the new plants are designed to meet the growing demand for insulating and building board products, and augment present production by J-M's Jarratt, Va. and Natchez, Miss., operations.

W. A. Young, formerly industrial relations manager at the Johns-Manville Toronto, Ont. plant, has been named plant manager at the new North Bay, Ont. location. W. H. Graham, plant manager at Natchez, Miss. has been appointed as plant manager of the Klamath Falls Ore. plant. His successor as manager of the J-M Natchez plant is Fred A. Morgan, formerly superintendent of production, finishing, planning and scheduling at the same location.

J-M's North Bay, Ont. plant, situated 200 miles north of Toronto has already begun test production runs. Provision has been made for future expansion of the plant. Ultimately it will employ about 300 persons at full scale operation. It will not only be Johns-Manville's first insulating board plant in Canada, but it will also mark the first building board plant in the Province of Ontario.

Early in 1958, J-M is scheduled to begin production at its new Klamath Falls, Ore. mill. Designed for future expansion, the plant when in full production is scheduled to employ 250 people and utilize more than 282,000 sq. ft. of floor space. The plant will use an estimated 50,000 cords annually of local lodgepole pine.

Johns-Manville has been in the insulating board business since 1929, when it leased a small plant at Oswego, N. Y. By 1939 J-M had outgrown the Oswego mill and a new insulating board mill was built at Jarratt, Va. Nine years later, 1948, a second insulating board plant was added to the J-M manufacturing facilities when a still more modern plant was constructed at Natchez, Miss.

Paper and Board Production

According to the American Paper and Pulp Association, the ratio to the United States production to mill capacity for the week ending Mar. 30, 1957, was 94.7 percent, compared with 96.1 percent, revised for the preceding week. The ratio for 102.2 percent for the corresponding week a year ago. Mills producing newsprint exclusively are not included.

The paper board production ratio for the week ending Mar. 30, 1957, was 92 percent, compared with 95 percent for the preceding week and 101 percent for the corresponding week last year.

(Detailed statistics on page 80).

Poster Contest Conducted By Simpson Paper Co.

A panel of three artists prominent in commercial art and education viewed the half hundred entries in the Simpson Paper Co. (Everett, Wash.) poster contest for employes and their families and selected nine winners who will receive a total of $350 in prizes. The contest promoted Simpson's recently inaugurated cost control program.

Using the theme of waste prevention and reduction of controllable costs through awareness of the effects of soaring costs, the contest elicited the interest and participation of not only the employe, but also that of adult members of employe families as well as their children. The five divisions were Class A for employes, Class B for children in school grades one through four, Class C covered fifth through ninth grades, Class D for 10th through 12th graders, and Class E for adult family members. A $50 savings bond was awarded for first place in each group with $25 bonds going to those placing second.

Ted A. Coates took top honors among employe entrants with Donald H. Johnson runner-up. Because of the general excellence of material submitted, the judges also gave honorable mention to Doris Bevins and Charles E. Clark. Adult family winners were Mrs. Walter S. Funk and Mrs. Forest Peters in first and second respectively with Mrs. Maxine Anderson and Mrs. Donald H. Johnson receiving honorable mention.

Linda Peters and Marla Ruth Funk were the winners in Class B and Kay Funk and Martha Mae Olson in Class C of the children's division. Miss Olson also received honorable mention for a second entry she submitted in that class. Only one entry in Class D for the older children won an automatic first award for Kathy Easterly.

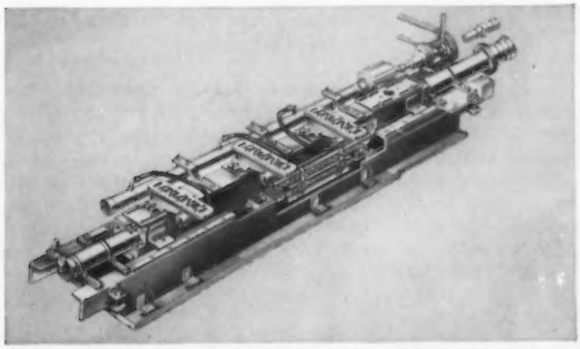
Posters submitted in the contest will be displayed in the various mill departments with the winning posters being circulated throughout the entire plant for all to see on bulletin boards as continuing reminders of Simpson's current program for operating efficiency as a basis for further progress and stability.

PRESS FELTS RUN OPEN AND CLEAN ALL WEEK LONG

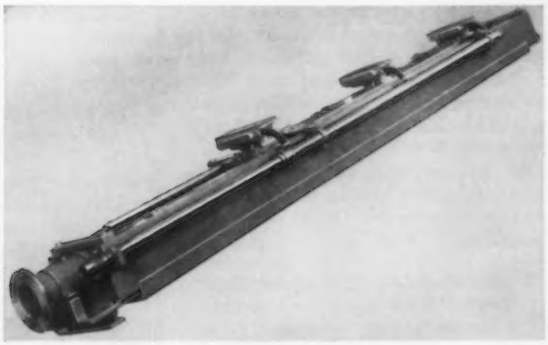
NO MORE COSTLY MID-WEEK SHUTDOWNS FOR FELT WASH-UPS WHEN YOU INSTALL VICKERY FELT CONDITIONERS

Not only do you get low-cost protection against high-cost shutdowns, but you reduce operating cost, too. Taking water out of the sheet at the presses is a lot cheaper than taking it out at the dryers.

Write for full information and layouts.



Vickery Felt Conditioners are also available in this traveling header design which is ideal when space is limited or when the felt runs directly beneath the Conditioner.



Vickery Wet Felt Conditioner keeps cylinder machine top and bottom felts continuously open and clean. A hydraulic drive moves conditioner boxes across the felt at just the right speed.

BIRD MACHINE COMPANY

SOUTH WALPOLE, MASS.

REGIONAL OFFICES: EVANSTON, ILLINOIS
PORTLAND, OREGON • ATLANTA, GEORGIA

Canadian Manufacturers of Bird Machinery
CANADIAN INGERSOLL-RAND COMPANY, Limited, Montreal

Caddoo Predicts Bright Future For Cylinder Boxboard

A bright future for cylinder boxboard was painted by William Caddoo, general manager of manufacturing for the Boxboard & Folding Carton Division of the Robert Gair Division, Continental Can Co., Inc. at the annual convention of the Folding Paper Box Association.

New research developments indicate, according to Mr. Caddoo, that future paperboard will have greater quality, uniformity and flexibility to meet the changing needs of the fast-growing packaging industry.

Areas in which the expanded research of the box mills has already shown great promise for carton makers, he said, were: 1—cleaner, whiter board through the use of non-pigmented coatings with exceptionally high hiding power; 2—high tear-strength board for carriers through the addition of long fibers to the inner plies of cylinder boxboard; 3—more uniform quality formation and possibly lower costs through instrumentation and a new vacuum-forming vat; 4—smoother products with greater printability due to new methods that eliminate waxes and asphalts from waste paper; 5—greater flexibility through "an astronomical number of combinations of colors, coatings and surface treatments."

Stressing that there will always be an important place in packaging for other paperboard products, he said that the inherent flexibility of cylinder machines makes it possible to produce a wide variety of board tailored to fit the customer's requirements. He urged the boxmakers who want special types of paperboard to ask for them, especially for test runs on new cartons.

Literature Available from C.P.P.A Technical Section

The following is a list of various reports, handbooks, etc. which have been prepared by various committees of the Technical Section Canadian Pulp and Paper Association and are available for purchase.

1—Factors Contributing to Sulphite Pulp Cleanliness: 1945—$3.00

This report is a condensation of the reports "Control of Dirt in Sulphite Pulp as Practiced by Canadian and Newfoundaland Mills," "Sulphite Flat Screen Operation and "Sulphite Woodroom Equipment Practice". These reports are based on confidential replies to questionnaires issued on the above topics and were compiled by the Sulphite Committee in 1945.

2—Bleached Sulphite Pulp for Paper: 1947—$2.00

To determine the procedures and equipment most desirable for the production of bleached sulphite pulp for paper, the 1946 Sulphite Committee circulated a questionnaire to bleached sulphite pulp mills and interested individuals. Replies from 15 mills in Canada and the U.S.A. and three individuals formed the basis for this report which includes a process diagram of the desirable sulphite mill.

3—Reduction and Utilization of Wood Waste: 1948—$2.00

In 1943 the Waste Committee decided to set up a program for the intensive study of this topic. The program consisted of three parts: (I) Utilization of Tree Tops, (II) Utilization of Sawmill Waste, Slabs, Shavings, Sawdust, (III) Economic Utilization of Forest Culls, and this report is the result of a request made by the Technical Section to the Waste Committee to compile a comprehensive report on this work.

4—Power Requirements for Paper Machine Drives: 1954—$2.00

The Electrical Engineering Committee distributed a questionnaire to 20 mills in Canada in an effort to obtain a cross section of the power requirements of newsprint machines operating in the speed range 1200-2000 feet per minute. The report, which includes Manufacturers' Paper Machine Data, Sectional Data, and Operating Data as its three sections, is a result of this extensive study.

5—Cylinder Covering Practice for Groundwood Deckers: 1953—$2.00

This report outlines procedures used by various mills in applying decker covering wires and the results achieved by each method. The information is presented as follows:

a—A concise resume of all replies to the questionnaire, highlighting unusual practice, results, etc. and including graphs to indicate how pH and temperature affect stainless steel and bronze top wire life.

b—An unabridged tabulation of all data.

c—Illustration of wire tightening, seam making, etc., as a supplement to parts (a) and (b).

6—The Drying of Paperboard: 1951—$1.00

The Board Committee instigated an investigation of the drying and production rates at various mills. The "tool" for the investigation took the form of a questionnaire which was in reality a production drying questionnaire as the emphasis was placed on production rather than upon thermal efficiency.

7—Fundametals of the Paper Machine: 1954—$2.00

An International Symposium on the Fundamentals of the Paper Machine was held at Appleton, Wisconsin in September, 1954 under the cosponsorship of the Technical Section. Canadian Pulp and Paper Association and the Technical Association of the Pulp and Paper Industry. This report is a reprint of all the papers presented at the Symposium and includes 48 pages of edited discussions of these papers.

8—The Drying of Sulphite Pulp: 1948—$2.50

The Sulphite Committee assembled through the co-operation of Canadian mill data on the mills Sulphite pulping drying operations. This report produces, in tabular form, data on the operation of sulphite pulp dryers, and some laboratory results of the effects of drying on pulp quality.

9—Sulphite Pulping Operating Manuals 1955—$2.00

This is an excellent manual prepared for use by young men starting out in the sulphite industry. It outlines the major steps and equipment in making sulphite pulp, and also explains the reasons why the basic operations are carried out without going too deeply into the technology of the process.

10—Hydrodynamics of the Fourdrinier Wet End: 1956—$2.00

This publication is a compilation of all the papers presented at an outstanding mission on the subject at the 1956 Annual Meeting. This session was of widespread interest and prompted a great deal of discussion which was tape-recorded so that it could be included in this publication.

Any of the above books may be obtained from Technical Section, Canadian Pulp and Paper Assn., 2280 Sun Life Bldg., Montreal 2, P.Q.

Summer Course Demand High At Western Mich.

Demand for the special summer course, "Principles and Practice of Coated Paper Manufacture," to be held from June 23 to July 13, and from July 14 to August 3, at Western Michigan University has been unusually strong, reports Dr. A. H. Nadelman, head of the paper technology department.

It is expected that registrations will be closed before the end of April, with 29 already admitted and the limit for each period being 20 persons.

The Swedish paper industry will be represented by Gunnar Wetterling, engineer for Hafrestrom Aktiebolag, Haverud, Sweden. Coming from Canada will be Frank O'Flaherty, Georgetown, Ont.

American companies planning to send employes include International Paper Co., Georgetown, S. C.; Missisquoi Corp., Sheldon Springs, Md.; West Virginia Pulp and Paper Co., Luke, Md., New York and Pennsylvania Co., Lock Haven, Pa.; Bergstrom Paper Co., Neenah, Wis.; Beveridge Paper Co., Indianapolis, Ind.; Weston Paper and Mfg. Co., St. Mary's, Ohio, and Allied Paper Corp., Kalamazoo, Mich.

Paper converters and suppliers to the paper industry are well represented, in addition to above named mills.

The course will be taught by the entire paper technology faculty, Dr. Nadelman, Dr. R. A. Diehm, Miss Carola Trittin and Raymond Janes.

Speakers from industry, production problem clinics and ten plant visitations during each course will enrich the program.

Preliminary plans have been made to repeat the course in 1958.

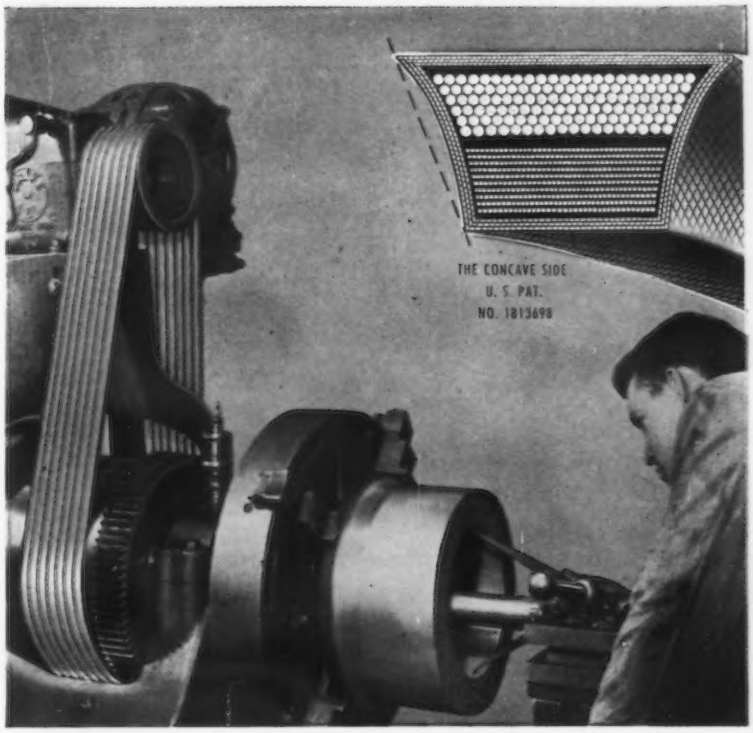
April 5, 1957

Dear Mr. Evans:

In my article "How Westvaco Measures Gloss on Moving Paper Webs" published in your journal of March 25, 1957, no mention was made of the gentleman who developed the gloss recorder. This was Dr. D. Noel Obenshain of West Virginia's Luke (Maryland) Research Laboratory, who has designed many of the controls used by our company.

I would appreciate your printing this letter so as to give Dr. Obenshain the credit he so rightfully deserves.

Sincerely yours,
James W. Field, Chemist
West Virginia Pulp & Paper Co., Tyrone, Pa.



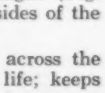
WHY you get more service from V-Belts with concave sides

Each sidewall of a Gates V-belt is concave (Fig. 1) — a precisely engineered curve that makes V-belts last far longer.

HERE'S WHY: on the bend around the sheave, the concave sides of a Gates V-belt fill out and become straight (Fig. 1-A). Thus the belt makes full contact with the sides of the sheave, grips the sheave *evenly*.

This even contact distributes wear uniformly across the sides of the belt. Uniform wear lengthens belt life; keeps costs down.

MAKE THIS SIMPLE TEST



Bend a straight-sided belt (Fig. 2). The sides bulge at the bend causing uneven contact in the sheave groove (Fig. 2-A). Naturally, wear is greater at points indicated by arrows. Result: shorter belt life, increased belt costs.

To cut down-time and V-belt replacement costs, specify belts that grip evenly and wear longer. Specify Gates Vulco Rope — the V-belt with concave sides. The Gates Rubber Co., Denver, Colorado — *World's Largest Maker of V-Belts.*

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

Gates

TPA 109A

Gates Vulco Rope Drives

PAPER PEOPLE

Ferri Casciani

P. J. Schmitt

Casciani Joins Glatfelter, Schmitt Promoted

F. Casciani has joined the Glatfelter top management group. He will coordinate the operation and administration of the Technical Service and Research and Development Departments.

Mr. Casciani was for many years associated with the Niagara Alkali Co., in Niagara Falls, N. Y., as research director in charge of the Research Laboratories. He has been active in TAPPI affairs and has been the author of several technical articles.

The company also has announced the promotion of Paul J. Schmitt to Technical Assistant to the general superintendent of the company. Prior to his promotion he was in charge of pulp development in the Technical Department.

Mr. Schmitt has been employed at the Glatfelter Mill for eight years.

C. R. Mulcahy

Wentworth Brown

Advanced by Charmin

Charmin Paper Products Co., Green Bay, Wis. has appointed Charles R. Mulcahy as Division A manufacturing superintendent. He was formerly technical assistant to R. E. Kissel, general manufacturing superintendent and will continue to report to him.

The newly created position involves the responsibility for four departments in the company's Division A plant; paper manufacturing, converting, printing and shipping-receiving-storing. Supervision at Division B and other departments at Division A which have been responsible to Mr. Kissel will continue under his direction.

Wentworth Brown Named a V. P. of W. R. Grace

Wentworth Brown has been elected a vice president of W. R. Grace & Co. He is general manager of the Paper Division of the Latin American Paper and Chemical Group.

Before joining the Grace organization in January, Mr. Brown was vice president of Canadian Chemical and Sellulose Co., Ltd., of Montreal and vice president and general manager of its two subsidiaries in British Columbia, Columbia Cellulose Co., Ltd., and Celgar, Ltd..

Managerial Changes At W. Va.'s Luke Mill

Promotion of William M. Thompson, technical service superintendent, and Paul E. Bowman, pulp mill superintendent, to newly created positions has been announced by John A. Luke, manager of the Luke Mill of West Virginia Pulp and Paper Co. The changes are effective immediately.

Mr. Thompson becomes general superintendent in charge of operations. Under the guidance of F. A. Borges, assistant mill manager in charge of operations, he will be responsible for the direction of the production, engineering and construction, and technical service activities of the mill.

Mr. Bowman will assume responsibility for the direction of the electrolytic, woodyard and outside departments as well as the pulp mill.

Mr. Thompson joined the company in December 1945 as a chemical engineer in the research department and subsequently was assigned to the Industrial Sales Division at the Luke and Covington mills. Later he was transferred to the Luke paper mill as a chemical engineer for two years. In 1952 he returned to the research department and was placed in charge of the experimental coater project. Upon completion of the design and construction of the experimental coater, he was promoted to technical service superintendent at the Luke Mill, the position he has held since 1955.

Mr. Bowman has worked at the Luke Mill ever since joining the company in June 1922. He worked as a chemist in the main laboratory and the pulp mill until 1929 when he was promoted to pulp mill superintendent, the position he has held since.

Prior to joining the company on a permanent basis, he had worked for seven years in various summer jobs at the mill.

Sievert Celebrates

Paul J. Sievert, of Mobile, oldest employee from the standpoint of service in the Southern Kraft Division of the International Paper Co. and its subsidiaries, and Mrs. Sievert recently celebrated their 50th wedding anniversary.

Mr. Sievert was first employed in April, 1900, by the Marinette & Menominee Paper Co., Marinette, Wis., a company which was purchased by the Continental Bag and Paper Co., which was later purchased by the International Paper Co.

Transferred to Bastrop, La. in 1930, and later to Camden, Ark., Mr. Sievert has been in Mobile since 1948. Today he is coordinating manager of paper mills. Two hundred local and out-of-town guests from all over the country attended the reception.

Hallin Named Asst. V.P.

Otis D. Hallin has been appointed assistant vice president for timber, Crown Zellerbach Corp. He was formerly vice president for timber, Crown Zellerbach Canada Ltd. in Vancouver, B. C.

Mr. Hallin has spent 31 years in industrial timber operations in Northwestern U. S. and Western Canada. He joined Crown Zellerbach in 1933 at Port Angeles where he became head of the timber department before becoming associated with the Grays Harbor Division of Rayonier in 1935.

Mr. Hallin rejoined Crown Zellerbach in 1943 and was named vice president for Crown Zellerbach Canada Ltd. in 1949. A past board chairman of the British Columbia Loggers' Assn., he is currently a member of the advisory committee for Forest Industrial Relations, Ltd.; a director of the Canadian Forestry Assn.; and a director and member of the executive committee for Crown Zellerbach Canada Ltd.

Two I. P. Men Retire

Donat De Perry, an employe of the International Paper Co. for 32 years, was given a dinner by the company in honor of his retirement, at Dean's Hotel, Portage,Maine, on March 28. De Perry received a gift which was presented by Morris Wing, assistant woodlands manager at Chisholm.

Herbert Summerfield, retiring as a superintendent of paper machines at the International Paper Co., Niagara Falls, N. Y., was honored at a party at the Willow Inn on March 30. He had been with the firm for 35 years.

Named Secretary of Chesapeake Corp.

Elizabeth S. Gray, assistant secretary since 1938 and acting secretary of The Chesapeake Corp. of Virginia since 1953, has been named secretary of the corporation.

Miss Gray has been employed by Chesapeake since 1934.

St. Regis Promotes Cathie

St. Regis Paper Co. has appointed Robert B. Cathie personnel director for its mills in Northern New York.

Mr. Cathie joined St. Regis in 1956 as assistant personnel director at the Kraft Center, Pensacola, Fla.

He spent 13 years at the Atomic Energy Commission project at Oak Ridge, Tenn., where he was the Industrial Relations Director for a service contractor.

Lynn Robinson continues as personnel manager and Orbbie K. Webber as assistant personnel manager.

Like one barber more than any other?

IF YOU DO, that's a good sign: you know what you want. You keep going to the same barber because you're confident he'll cut your hair exactly *the way you like it.* He treats you with special care.

People who buy chlorine from Wyandotte know what they want, too. And that's the very reason they buy from us! They know Wyandotte will treat them with special care.

And their confidence is justified — for from basic raw materials to delivery of the finished product, we baby our chlorine every step of the way, keep it under rigid control . . . sell it with a *guarantee of satisfaction.* And we back up this guarantee with the highest caliber technical service.

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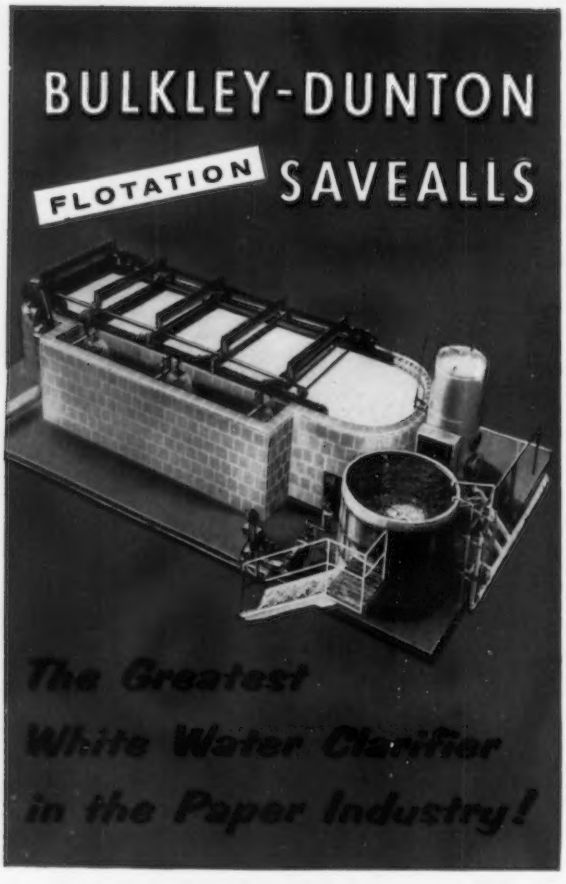

The first Flotation Savealls installed by Bulkley, Dunton in a United States paper mill — almost 20 years ago — are still operating with the minimum of supervision and maintenance. Since then, Bulkley, Dunton Savealls have become the standard of comparison throughout the paper industry.

Bulkley, Dunton Flotation Savealls recover valuable fiber and filler from white water in a matter of minutes permitting it to be returned immediately to process. The savings in filler and fiber, together with the B.T.U.'s in the clarified effluent, help pay for the installation in a short time. Frequently, the heat recovery is more important that the fiber.

Where stream pollution is a problem, Bulkley, Dunton Savealls may well be the most economical answer. One mill, reduced their fiber loss to 41 pounds per day . . . fifty four thousandths of 1% (0.054%) . . . well below the 1% required by law!

If you have a white water clarification problem, Bulkley, Dunton will survey your requirements and make recommendations . . . with no obligation. For information and literature, write today.

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Koons Resigns From Bowaters Southern

George R. Koons, industrial relations manager at Bowaters Southern Paper Corp., Calhoun, Tenn. since 1952, has resigned to become director of industrial relations with the Carter Carburetor Co. with headquarters at St. Louis, Mo.

Mr. Koons has spent the past 18 years in the pulp and paper industry. Prior to joining Bowaters in 1952, he held various industrial relations positions with the Kimberly Clark organization. He was formerly personnel director of the Coosa River Newsprint Co., Coosa Pines, Ala.

Skipper Heads I. R. For Bowaters Southern

John T. Skipper has been appointed industrial relations manager of Bowaters Southern Paper Corp., Calhoun, Tenn., effective May 1. Mr. Skipper has served as assistant industrial relations manager at Bowaters' Tennessee mills since March, 1953, and succeeds George R. Koons.

Sutherland Promotes Pete Abendroth

The Netherland Paper Co., Kalamazoo, Mich., announces that Herman (Pete) Abendroth has been named assistant superintendent of its Division Two. He replaces Wayne Topp, who has accepted a position with another firm.

Mr. Abendroth joined Sutherland in 1922 as a picker in the cutting department of Division Two. Later, he became a pressman and make-ready man. In 1948, he was promoted to cutting shift foreman. In 1955, he became head of the cutting department.

A replacement for Mr. Abendroth as cutting department head will be appointed by the Supervisory Review Board in the near future according to Ivan Forster, general superintendent.

Husband Joins Consolidated

Dr. R. M. Husband, formerly of the New York State College of Forestry has joined the research department of Consolidated Paper Corp. at Grand Mere, Quebec.

River Raisin Names Hays to Sales Post

James R. Hays, formerly with Libbey-Owens Ford Glass Co., has been appointed to handle sales of River Raisin Paper Co., Monroe, Mich., in the Toledo, Ohio area.

THE CASE OF THE

DEADLY PINHOLES

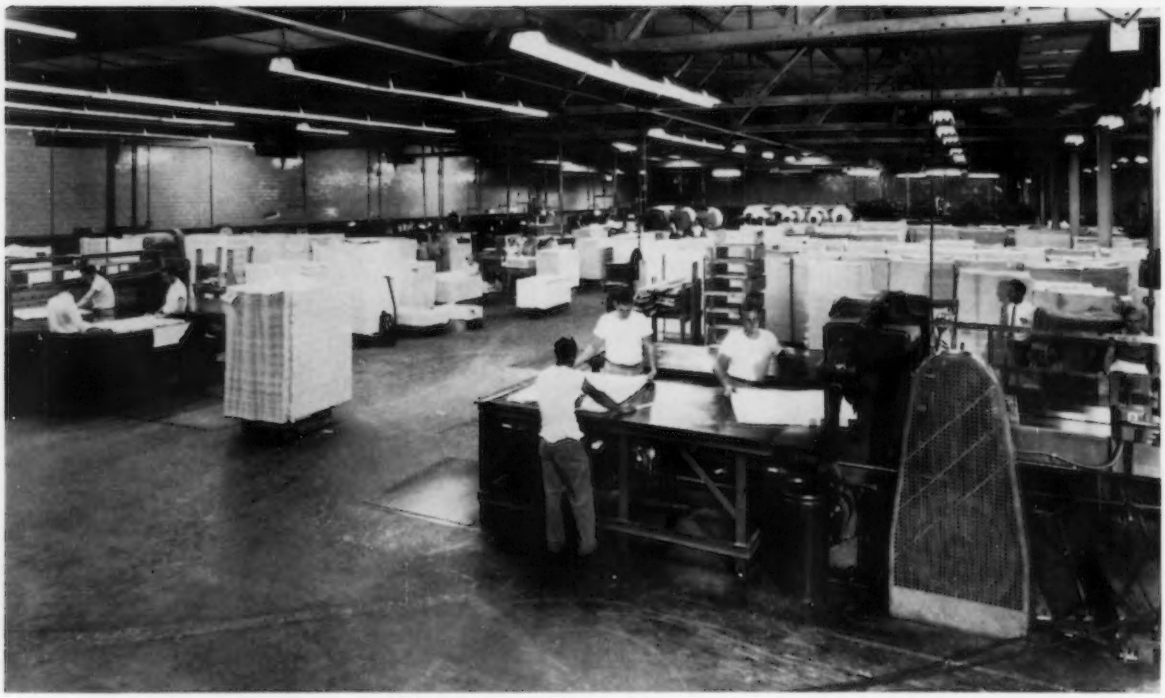
A witch doctor couldn't have done a better job of mutilating the paper. The test coating run was suffering from deadly pinholes . . . and the production manager needed a fast cure to save his paper and his profits!

He got it by calling in a specialist . . . the Borden paper technician . . . who quickly prescribed Borden's FF-30 Casein. It's the super-casein that produces a coating practically free from the entrapped air that is a major cause of deadly pinholes. It solved the problem like magic.

Mr. Production Manager discovered that Borden's FF-30 worked wonders for paper coatings in other ways, too. It eliminates "fish-eyes" . . . makes true "high-fidelity" printing possible. It has excellent leveling and flow properties. It responds well to additives commonly present in clay coatings such as pigments, fluorescents, latices and other plasticizers. It is particularly free from dirt and bacteria and can be dispersed very easily in water or added directly to the clay or pigment slip with no tendency to form lumps. And it exhibits improved adhesive strength and good color.

If you're looking for the cure to a paper coating problem, call on a Borden paper technician. He can prescribe from a wide range of caseins and caseinates. And he has Borden's 50 years of experience in the paper industry to back him up. Contact him at The Borden Company, Chemical Division, Casein Dept. T-47, 350 Madison Ave., New York 17, N. Y.

IF IT'S A Borden Chemical IT'S GOT TO BE GOOD!



Ingenuity in Equipment and Methods Shown in Moraine Finishing Operations

E. F. Barker

Field Editor, Paper Trade Journal

Moraine Paper Company, Division of the American Envelope Company, in West Carrollton, Ohio has one of the most interesting fine paper finishing operations found in the industry. The informed observer walking through Moraine's Finishing Room, is impressed by the department's efficiency, precision of operations and the ingenuity reflected in its equipment and methods.

Moraine's Finishing Department encompasses a high number of unusual mechanical devices that help make its operation more efficient. These are augmented by a number of well planned and successfully proven operational methods which in themselves contribute much to the success of this operation. Taken individually, these motion and waste saving devices would not and should not make this impact. However, when brought together in one mill they create something quite unusual in finishing room operations. What follows is an analysis of this modern mill's finishing operations and a description of the devices and methods used to achieve this overall effect.

Highlights Equipment

An inventory of Moraine's unusual and noteworthy Finishing Department equipment reads something like this:

1—Cutters equipped with roll turntables.

2—Pneumatic cutter-shavings removal system.

3—Modified skid lifts at cutter layboys.

4—Air conditioned department.

5—Systematic broke handling.

6—Paper skid vacuum cleaning.

7—Foreman's office that overlooks the entire department.

8—Adjustable sorting lights.

9—Movable roll shaft equipment.

10—Dual hydraulic "Levelators" on trimmers.

11—Overhead pneumatic skid strapper.

12—Electric eye door opening system.

13—Automatic tape cutting device.

Highlights Methods

Here is also a brief inventory of some of the methods and practices that add substantially to Moraine's efficient operations:

1—A constant and continued emphasis on good housekeeping.

2—Individual incentive system.

3—Use of the "inspector tag" system.

4—Overall flexibility of operations.

5—Effective penalty methods (dis

ciplinary action).

6—High quality goals and a well organized quality control system.

7—Suggestion system

8—Minimum of "Red Tape."

9—Logical materials handling methods.

Cutter Roll Turntables

Moraine was one of the pioneers in the utilization of a turntable at the cutters to reduce cutter downtime. Each of the department's cutters is equipped with a dual set of roll stands, arranged in parallel and bolted to a movable turntable, placed flush with the floor. This permits the empty and parallel section of the roll stand to be loaded while the cutter is operating. The table is driven by four 1½ horse power induction motors. Moraine Paper Company holds patents on this device, licensed to the Dilts Division of the Black Clawson Company.

Production per cutter was almost doubled when this equipment was installed several years ago. Moraine's two cutters are operated by a seven man crew: one layboy operator and one cutter operator for each cutter and three cutter loaders who handle loading and sheet haul-away at both cutters. The layboy operators also double as cut-sheet inspectors.

Friction controlling back stand bearings which permit automatic self-alignment of the roll shaft in the bronze bearing are another Moraine cutter improvement. The company also holds patents on these bearings, again licensed to Dilts.

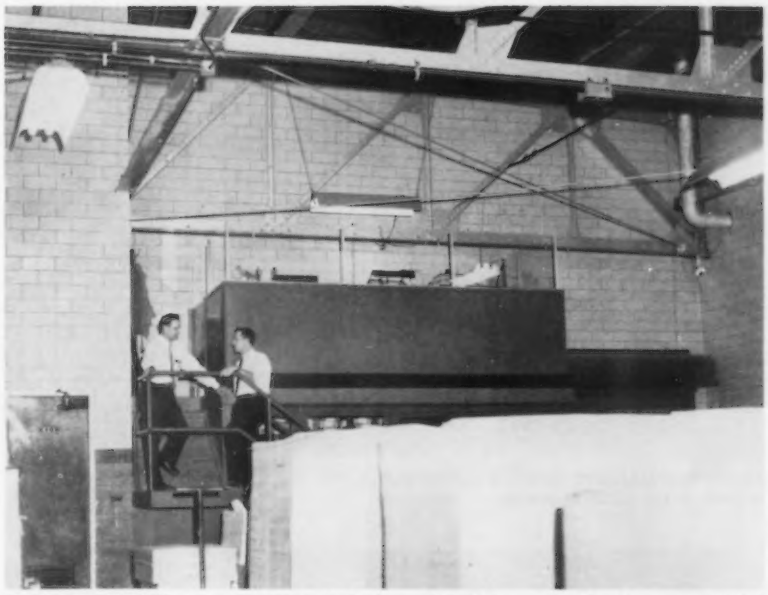
No More Slitter Dust

Moraine's Finishing Department now makes it a routine practice to vacuum the sides of all skids immediately after they emerge from the cutters. A standard industrial vacuum cleaner is used. Moraine has found that this vacuuming operation has reduced slitter dust to a point where complaints, attributable to this source, have been substantially diminished.

Air Conditioning Plant

The Finishing Room is equipped with a 100 ton Kathobar air conditioning unit. The department's atmospheric target conditions are 50 percent Relative Humidity and 74° Fahrenheit. Maintenance department employees charged with maintaining the air conditioning plant, check the department's atmosphere daily with a sling psychrometer. The Quality Control Laboratory also checks the atmospheric conditions for its own records. In addition a continuous recorder provides a 24 hour history record.

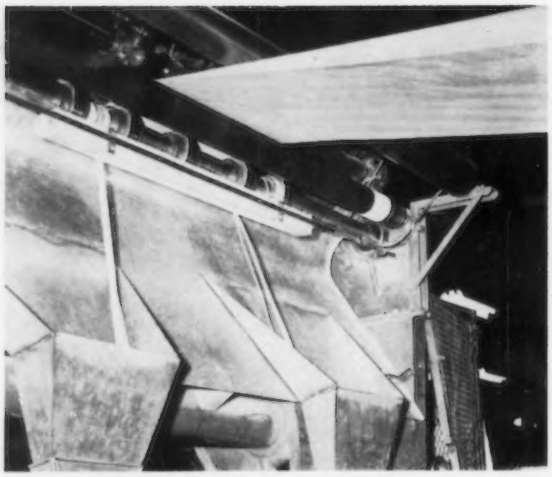
Moraine chose the Kathobar air con-



ELEVATED OFFICE gives unobstructed view of finishing area. On steps are (left) Russell Green, Finishing Department Supervisor and William R. Zimmerman, Mill Manager.

TRIMMERS have two hydraulic lifts. Horse-shoe area surrounds trimmer operator.

TURNTABLE permits almost continuous operation of cutters.



SHAVINGS REMOVAL DUCT at cutters are part of Moraine's orderly broke handling system.

BROKE CHUTES close automatically when not in use to prevent escape of controlled atmosphere in a finishing dept.

OVERHEAD SUSPENDED STRAPPING TOOL plus a simple skid wrapping method have substantially increased skid strapping output.

ANSWER TO SLITTER DUST: Vacuuming each skid as it comes from the cutters. (Notice soundproof telephone booth in background).

INDIVIDUAL LIGHTS for each sorter. Lights are adjustable so that sorter has a good source of light, whether she sits (L) or stands (R).

ditioning unit because this equipment makes it possible to utilize ample available mill steam and ground water.

Finishing Department Office

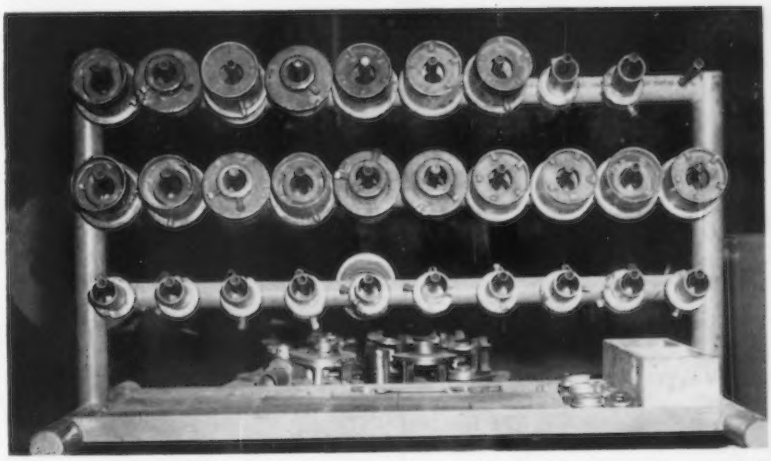
A relatively minor point, but another typical factor contributing to the overall departmental efficiency is the position of the finishing department supervisor's office. Located on a balcony structure, its glass walls permit an unobstructed view over the entire 200x100 foot finishing department floor. This makes it possible for the finishing department supervisor to keep a watchful eye on his operations, at times when he is not on the floor. He shares his office with an assistant supervisor and a production control clerk.

MOVABLE ROLL SHAFT BENCH makes for ease of handling heavy shafts.

Broke Handling

Moraine's Finishing Department broke handling methods are simple, yet efficient. As cutter shavings come from the cutters they are removed from the finishing department by overhead pneumatic pipes which carry the shavings to the machine room basement where they are dropped on clean floor spaces. Moraine has found that there is little advantage in dropping the shavings into a basement broke box because this would only make it more difficult subsequently to transfer the shavings to the baling pit. Stacking shavings on open basement floor area makes it a simple operation to push the shavings into the baler pit.

Other department broke is handled with conventional broke carts on the finishing room floor. When filled, the broke carts are rolled to one side of the finishing room where chutes, leading directly to the basement, are installed along the entire wall of the finishing department. These chutes are equipped with metal lids that close automatically when the chutes are not in use. This simple device aids in preventing the escape of conditioned atmosphere from the finishing room. Broke carts in the basement are positioned at the lower end of the chutes. Each full broke cart represents exactly one bale. This system is used to bale broke when varieties of color do not make immediate broke return into the machine system possible. Whenever possible unbaled broke is delivered to the stock preparation department in broke carts for direct return into the system.



"A PLACE FOR EVERYTHING and everything in its place": Portable cutter roll shaft chuck rack.

Sorting Room Lights

Another simple, yet impressive device is Moraine's sorting line light system. Each sorter is provided with a pair of

QUALITY IS EMPHASIZED ALWAYS. Inspector checks sorters and keeps quality records.

STORAGE BINS for finished paper at Moraine Paper Co.

individual florescent, two tube light fixtures, adjustable horizontally and vertically according to the sorter's individual convenience. Moraine found that installation of these lights served to increase sorting production and reduced personnel fatigue. They give each sorter an individual and effective light source adjustable for personal comfort.

Two Lifts at Trimmers

Moraine's trimmers are equipped with two lifts or "Levelators" which are raised and lowered hydraulically. The trimmer operator works in a horse-shoe shaped area surrounding him. The horse-shoe is formed by the trimmer tables on both sides and the trimmer itself in front of the operator. The two lifts are located at the horse-shoe's open end. Two trimmer helpers are charged with loading and unloading the trimmer tables, as well as skid handling in the immediate trimmer area. One hydraulic lift handles trimmed papers, the other handles the untrimmed stock. Thus relieved of all paper handling, stacking and procuring chores, the more skilled trimmer operators are, therefore, fully occupied with the actual trimming operation.

The trimmer tables are equipped with conventional air floats. Moraine stressed the importance of having polished tables to facilitate easy stock sliding on the table surfaces.

Moraine also utilizes a "sword" which is run through the paper stacks at the point where stack separation is desired at the trimmers. Running the "sword" (a modified doctor blade) through the stack breaks the friction bond and permits easier sliding and consequently more effortless handling.

Overhead Skid Strapper

The recent installation of a counter-weighed overhead skid strapper, plus the use of a simple skid wrapping method, has resulted in increasing skid wrapping and strapping performance at Moraine. The overhead skid strapper consists of a Signode ceiling suspended strapping tool and strapping spool. The tool travels along rails suspended from the ceiling. It is a simple matter, therefore, to move the tool from one point to another in the skid strapping area. The tool is pneumatically operated and provides more uniform strapping tensions.

Moraine's skids are wrapped simply and easily by means of a wrapping roll stand that makes it possible to unwind the wrapper roll in a vertical position. With the roll stand placed beside the skid to be wrapped, the operator needs only to unwind the roll, walk around the skid and thus wrap it in a matter of seconds. When the operator has circled the skid with the unwinding wrapper he simply cuts the wrapping material and tapes the ends.

Automatic Tape Cutting

Moraine has demonstrated that small time-and-motion saving devices can be of great significance in a finishing operation. A further example of this is a simple device at the tape dispensers in the sealing department. These tape dispensrs are electrically operated and the cutting mechanism is activated by pressure switches installed at knee level in front of the sealing and wrapping benches. The moistened tape is cut into predetermined lengths each time the operator activiates the tape dispenser by knee pressure against th switch.

"Little Things That Count"

Numerous other inovations and practices, all seemingly insignificant in their own right but adding up to an impressive total complete the inventory of mechanical aids in the Moraine Finishing department. Among these items are, for example, smoking cubicles deliberately designed to provide standing room only, with occupancy not to exceed two people.

Moraine uses fiber glass reinforced tape for carton packing. This was found considerably more economical than the still-common practice of using tape and fiber glass reinforcing separately.

In the department's stock storage area a special lift truck was designed, to provide a minimum turning radius, thereby reducing the amount of aisle space needed. The effective use of storage capacity (the special lift truck also made use of extra overhead racks possible) has increased overall capacity between 30 and 40 percent.

Seventy-five percent of the Finishing department's employees wear uniforms, considered an important morale booster. The company pays half the bill. The uniforms are rented from a work-clothes supply firm which supplies newly laundered uniforms weekly.

The department's most heavily travelled thoroughfare, the door between the finishing department and the stock storage area, is equipped with an electric eye which automatically opens and closes the sliding doors. This, too, materially aids in preventing the escape of controlled atmosphere.

The cutter department is equipped with a movable roll shaft bench which makes for easy transportation of the heavy shafts from the cutters to the floor-stored rolls. Another movable bench acts as a handy portable storage rack for cutter roll shaft chucks.

Cleanliness is stressed continuously in Moraine's Finishing department. Even the janitorial supplies are kept orderly on movable carts in which each janitorial tool has its place.

Close attention to overall efficiency is even found in the communications field. Phones on the finishing room floor are housed in small sound absorbing booths.

Methods Too . . .

If Moraine's Finishing department equipment shows evidence of ingenious attention to operational detail wherever you look, then the departmental methods are no less impressive. The mill generally takes a simple and direct approach to methods, material flow and employee relations.

Moraine's Finishing Department does not use a "straight line" of conveyorized materials handling method as practiced by many larger mills because the greatest possible degree of flexibility is desired. Flexibility of operations . . . being able to handle special orders easily without sacrificing efficiency and the

ability to define responsibility for operational errors as well as to handle a greater variety of smaller orders . . . is particularly important for Moraine and mills of its size.

No Loss of Identity

Work done by all finishing room operators, regardless of their specific function, can be easily identified through the use of traveling work tickets which move with the paper as it is processed. Copies of these numbered tickets are also used for individual incentive payment.

The tag system serves a number of functions at Moraine. It permits easy checking of customer complaints. If necessary, this in turn provides a factual basis for disciplinary action against employees. But even more important is the fact that workers seemingly take a far greater interest in their work when it is identified in this manner. They prefer this system with its preservation of individuality, to having the identity of their work completely submerged by similar or unidentified work performed by others.

Penalties

Moraine has a well defined penalty system based on errors discovered in the department or possible complaints originating in customer's plants.

Moraine's quality control and penalty systems work hand in hand. In addition to a fulltime inspector, the sorter forelady spends part of her time inspecting the work performed by the sorters. If errors are found a financial penalty, levied against the sorter's incentive bonus, may result.

Under Moraine's penalty system employees receive a special "pink letter" for each traceable customer complaint. This written reprimand represents a warning and explains the exact circumstances and nature of the complaint. An accumulation of written reprimands may result in a disciplinary action such as lay-off or discharge of the delinquent employee.

The identification of the work of individual employees is carried to the point of ultimate paper use by a label contained in each Moraine package, requesting the customer to return the ticket if the product is not up to standard.

Incentive System

Moraine is sold on its incentive system and so are its employees. Incentives are applied to all production jobs which are not machine controlled and production standards are posted at all finishing department sections. Moraine has established incentive standards for the following finishing room operations: cutting, sorting, trimming, skid packing, skid supply, roll wrapping, sealing and carbon packing.

The mill uses a standard hour plan, the most common incentive program in industry today. Its standards are engineered to reflect small differences in job content and effort and are not overall yard sticks. As many operational variables as possible were taken into consideration when the standards were established. Moraine's management readily admits that such a system creates many problems, but feel also that a properly administrated incentive system results in superior production and superior quality. It was emphasized that as each individual applied his consistent best efforts and his full attention to his work, quality rose along with quantity produced. The system therefore actually increases production, with no loss of quality. Not only have individual productivity and earnings risen, but employees' job satisfaction has also been raised considerably.

A predominant majority of the department's operators are self-paced with backlogs of work provided at all times. This means that employees are given full opportunity to take advantage of their incentives. It also makes it possible to balance various operations at will, thus compensating for the loss of some of the advantages of the conveyorized straight line production method.

Alvin H. Johnson & Co.

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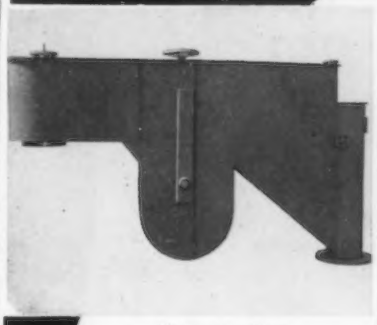

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Latest Thoughts on Groundwood, Kraft and Cylinder Machine Instrumentation

E. J. Cole and M. Todd

The following three short articles are appendices to three of the "Instrumentation" chapters which we have previously published. These appendices have been prepared by the authors in response to suggestions by our readers and will be included with their corresponding chapters in our forthcoming book on the subject. The authors welcome further comments, criticisms and suggestions.

Groundwood Pulp Save—All Instrumentation

The adequate instrumentation of fiber recovery systems is very important since they should be completely automatic. One type of equipment used for this service is the WACO filter.

Figure **2** shows the instrument arrangement where the filtrate is pumped out. The white water overflows from the machine system to the supply tank from which it is pumped to the main vat at a rate determined by the level recorder controller **1.** Level recorder controller **4** controls the level inside the cylinder by controlling the output valve on the filtrate while level controller **2** adjusts the speed of rotation so keeping the vat level constant.

The rate of feed of the thick stock which precoats the wire and so forms the filtering medium is controlled by level controller **3.**

Frequently, a flow recorder is fitted to the filtrate line to give the quantity of waste.

This equipment is also used for the removal of solids from the water supply to a mill or the removal of solids from alkaline pulping black liquor prior to evaporation.

Figure numbers used here refer to the appropriate position which they will occupy in their respective chapters.

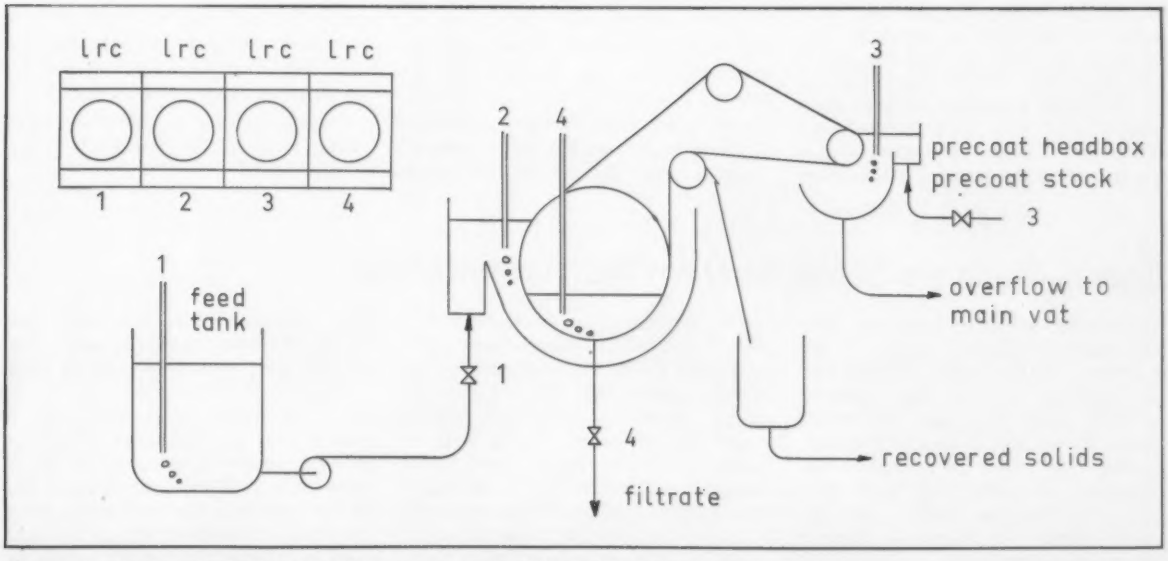


Figure 2—Instrumentation for fiber recovery by Waco filter.

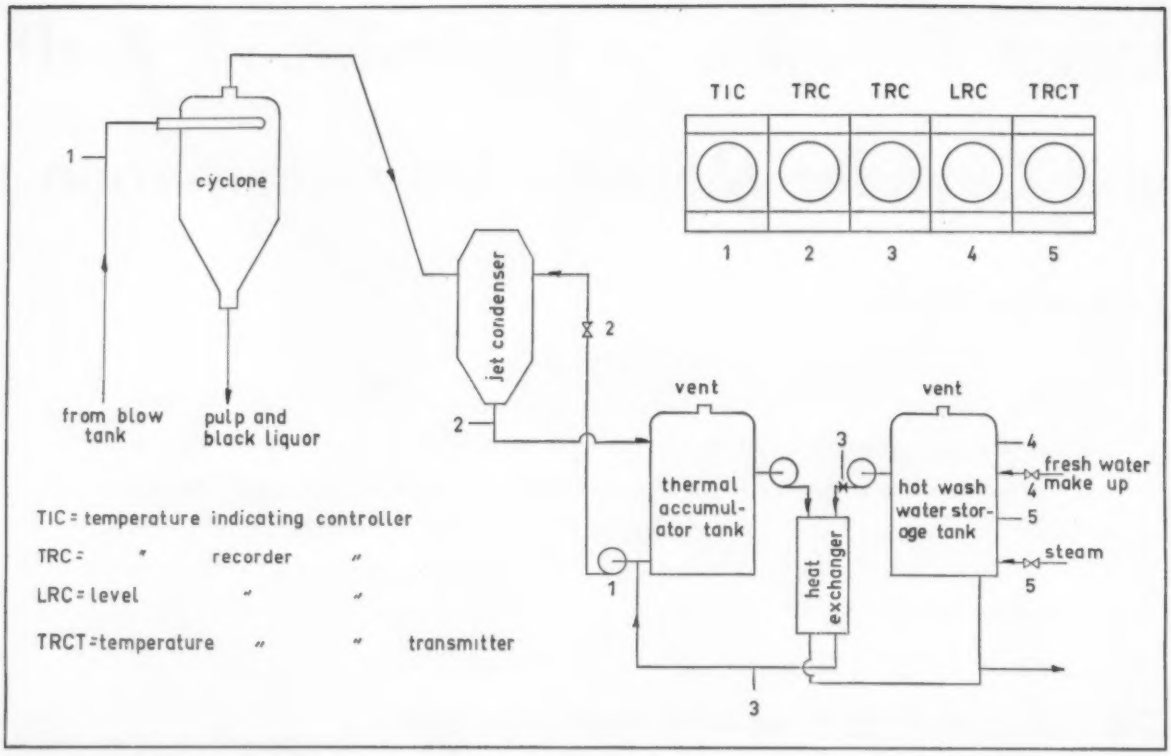


Figure 6—Kraft blow tank heat recovery system

More on Kraft Pulp Heat Recovery

A more efficient system of heat recovery is shown in Figure 6. Here there is separation of the possibly contaminated water resulting from the condensation of the steam from the blow from the heated water finally passed to the process.

The steam from the blow tank passes to a cyclone where any pulp and black liquor carried over is removed. The steam is then fed to a jet condenser, the condensing water for which is pumped from a separate thermal accumulator tank. As soon as the blow commences temperature indicator controller **1** starts the pump which supplies the condenser spray. The operation of the condenser is controlled by temperature recorder controller **2** which measures the outlet temperature and controls the rate of flow of the spray.

The heated water from the thermal accumulator is pumped through the heat exchanger with the hot wash water to be heated on the other side. Temperature recorder controller **3** measures the temperature of the water from the thermal accumulator tank as it leaves the heat exchanger. If the temperature of the water leaving the heat exchanger is lower than that in the hot wash water storage then temperature recorder controller **3** by closing valve **3** stops the flow of wash water to the exchanger.

Temperature recorder controller **5** which controls the input of direct steam to the hot wash water tank for the case when the heat from the exchanger is insufficient at the same time transmits a signal to temperature recorder controller **3** and thereby changes the set point of this instrument.

4 is a level recorder controller maintaining level in the hot wash water storage tank.

Board Machine Stock System Instrumentation

The pulp or waste paper or other raw material is fed to a pulper by the conveyor. Board machine systems usually have four different stock systems: top liner, under liner, filler and bottom liner. The top and bottom liner systems having high grade raw materials are commonly operated on the batch principle: the filler and under liner are usually continuous. Figure **8** shows a system for a top liner.

The operator starts the cycle with a push button which opens solenoid actuated valve **P.** At the same time an interlock assures that valve **1** remains closed. When the measuring tank is empty the low contact in the level recorder controller breaks the circuit closing **P** and opening **1.** Level recorder controller then controls automatically the refilling of the measuring tank.

The pulping time is set on a timer (not shown). When this time has elapsed the timer sounds a horn. The operator then opens a valve **Q,** by push button, which at the same time starts the pump. When cycling chest No. 1 reaches the required level, level recorder controller **4** automatically opens valve **4A** and **4B** and closes **5A** and **5B.** At the same time the stock pump from the chests is automatically started and stock is pumped through the refiner to

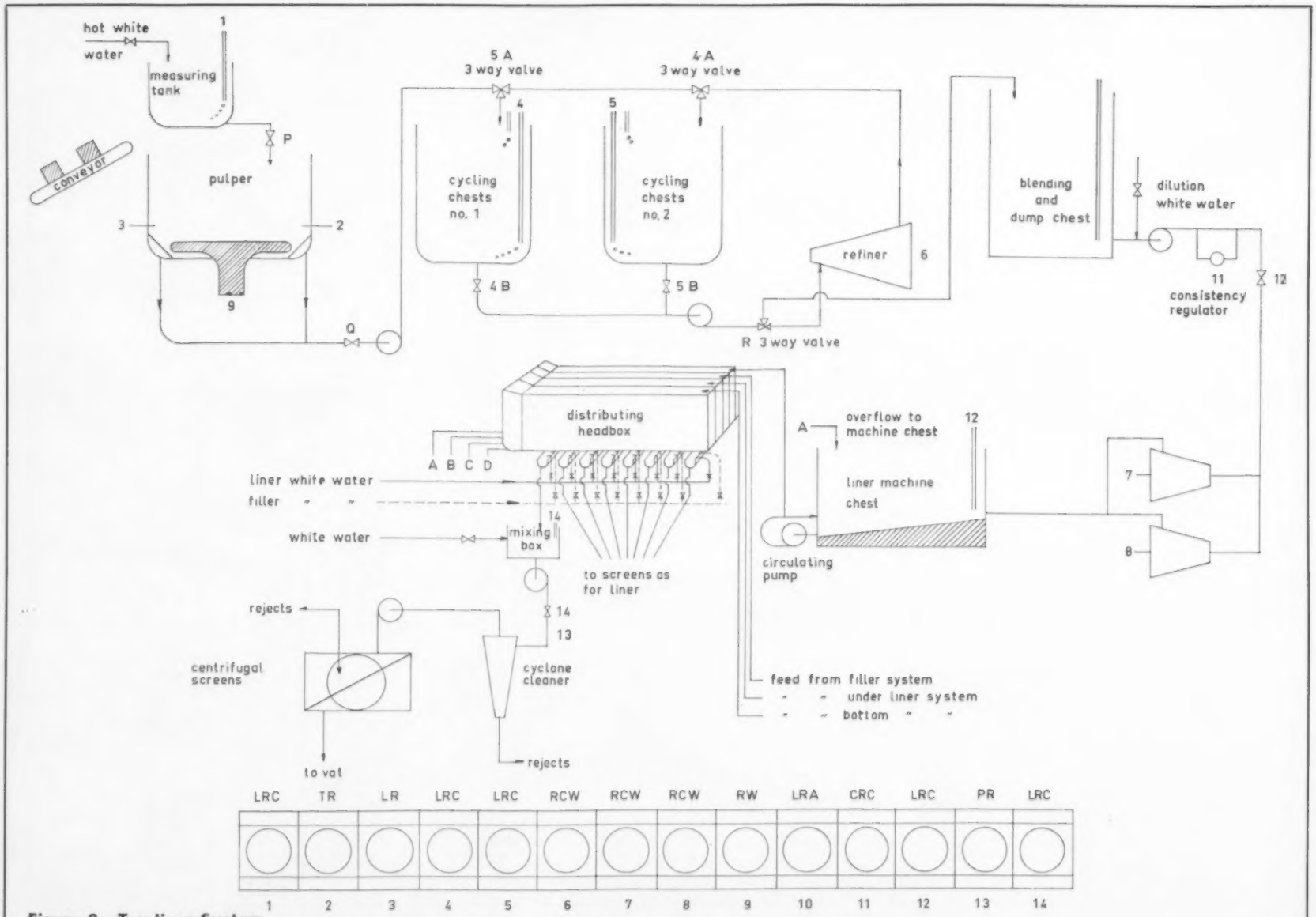


Figure 8—Top liner System

chest No. 2. When the lower level of No. 1 chest is reached level recorder **1** closes **4A** and **4B** and opens **5A** and **5B.** Switches on these valves send an impulse to an impulse counter when they are reversed. The process is then continued pumping from chest 2 back to chest 1. After a preselected number of cycles the impulse timer will open three way valve **R** so that stock is pumped to the blending and dump chest, in which there is a level recorder fitted with an alarm.

The consistency of the stock pumped from the blending chest is controlled by consistency regulator **11** and is pumped through refiners. These refiners like the one on the cycling chests are fitted with recording controlling wattmeters which maintain a constant load by positioning the plug and so control the degree of refining. They are also fitted to actuate a plug withdrawal mechanism if the load rises beyond a certain point due to failure of stock supply.

The machine chests following the jordan, illustrated by liner machine chest in the figure, is level controlled and fitted with a circulating pump from which a take off supplies stock to a distributing headbox. In this headbox a constant level is maintained with overflow back to the chest. Each type of stock has its own channel with an overflow back to the respective chests to maintain a constant level. Manually operated stuff gates allow the required quantity of stock to pass to troughs connected to the various vats. Dilution is effected at this point by the addition of white water through manually controlled valves.

The stock from the distributing headbox passes to a level controlled mixing box by **14** where there is further dilution. The stock is then pumped through cyclone cleaners and centrifugal type screens to the various vats.

NEWS OF CONVERTERS

Dennison Elects Huntington

The Dennison Mfg. Co., Framingham, Mass., has elected Dana C. Huntington, president. He succeeds John S. Keir, who becomes chairman of the board. Treasurer R. N. Wallis was also elected to be a vice president.

Mr. Keir will remain as president of Dennison Mfg. Co. of Canada, Ltd., and Dennison Co., the export branch. Mr. Huntington has been with the company since 1919, has been a director since 1943 and vice president since 1954. He is also managing director of the Dennison Mfg. Co., Ltd., of London.

Fox Paper Expands High Point Operations

In order to service the furniture trade more advantageously, the Fox Paper Co. has decided to increase production at High Point, N. C.

It expects to have equipment, now being built at the Lockland, Ohio, plant, delivered to High Point for expanding business in paper pads and cellulose products.

The company is now installing equipment for the manufacture of a complete line of garment bags in all sizes, which should be in operation within a week, and it will permit Fox to service the paper merchants, not only in the High Point area, but in the surrounding territory which will include Winston-Salem, Greensboro, Durham, Raleigh, Charlotte, Hickory, Asheville and Danville, Va. It is becoming increasingly difficult for the paper merchants to absorb the terrific freight costs on all items, and with this setup the paper merchants can pick up their daily or weekly requirements at Fox's plant.

The equipment now being installed in this plant will manufacture plain paper bags. However, printing equipment will be added as soon as this unit is operating satisfactorily. It is also The Fox Paper Co.'s intention to supply in the near future millinery, notion, and other specialty bags to complement the garment bag line. The installation of the present garment bag machine will involve an expenditure of between $25,000 and $39,000, and the equipment for the manufacture of cellulose wadding and indented paper pads and blankets will be considerably in excess of the cost of the garment bag machine.

Folding Carton Group Reelects Greenway

Norman F. Greenway was re-elected president of the Folding Paper Box Assn. at the group's annual convention in Chicago, April 1-4. Mr. Greenway is vice president and general manager of the boxboard and folding carton division, Robert Gair Group, Continental Can Co., Inc., New York.

Serving with Mr. Greenway as members of the executive committee will be: William J. Alford III, Alford Cartons; William B. Leavens Jr., Wilkata Folding Box Co.; Arthur N. Morris, Newth-Morris Box Corp.; Bayle M. Richardson, Richardson Taylor-Globe Corp.; Leo H. Schoenhofen, Container Corp. of America; and William H. Walters, U. S. Printing & Lithograph Co.

FPBA has some 200 members whose annual sales represent more than half the industry's total volume of $900 million. In his report to the 400 delegates at the FPBA convention, Mr. Greenway predicted that the industry's sales would reach $1.5 billion by 1967 "as more retailers, switching their stores to self-selection, demand better packaging."

Changes in Sales At Western Waxide

John W. Greve has been named assistant sales manager, Los Angeles plant, Western-Waxide Specialty Packaging Div., Crown Zellerbach Corp. He was formerly manager, Waxed Paper Division, Paterson Parchment Paper Co., Bristol, Pa.

Roddy Rauch, district sales representative, Salt Lake City, Utah, has been named sales representative, Los Angeles plant.. Mr. Rauch joined Crown Zellerbach in 1931 and was assigned to the Western-Waxide Division in 1951.

Frank Brown, who joined Western-Waxide Division in 1955 as a sales trainee, North Portland, Ore. plant, replaced Mr. Rauch in Salt Lake City.

Girard Paper Suffers Fire Damage

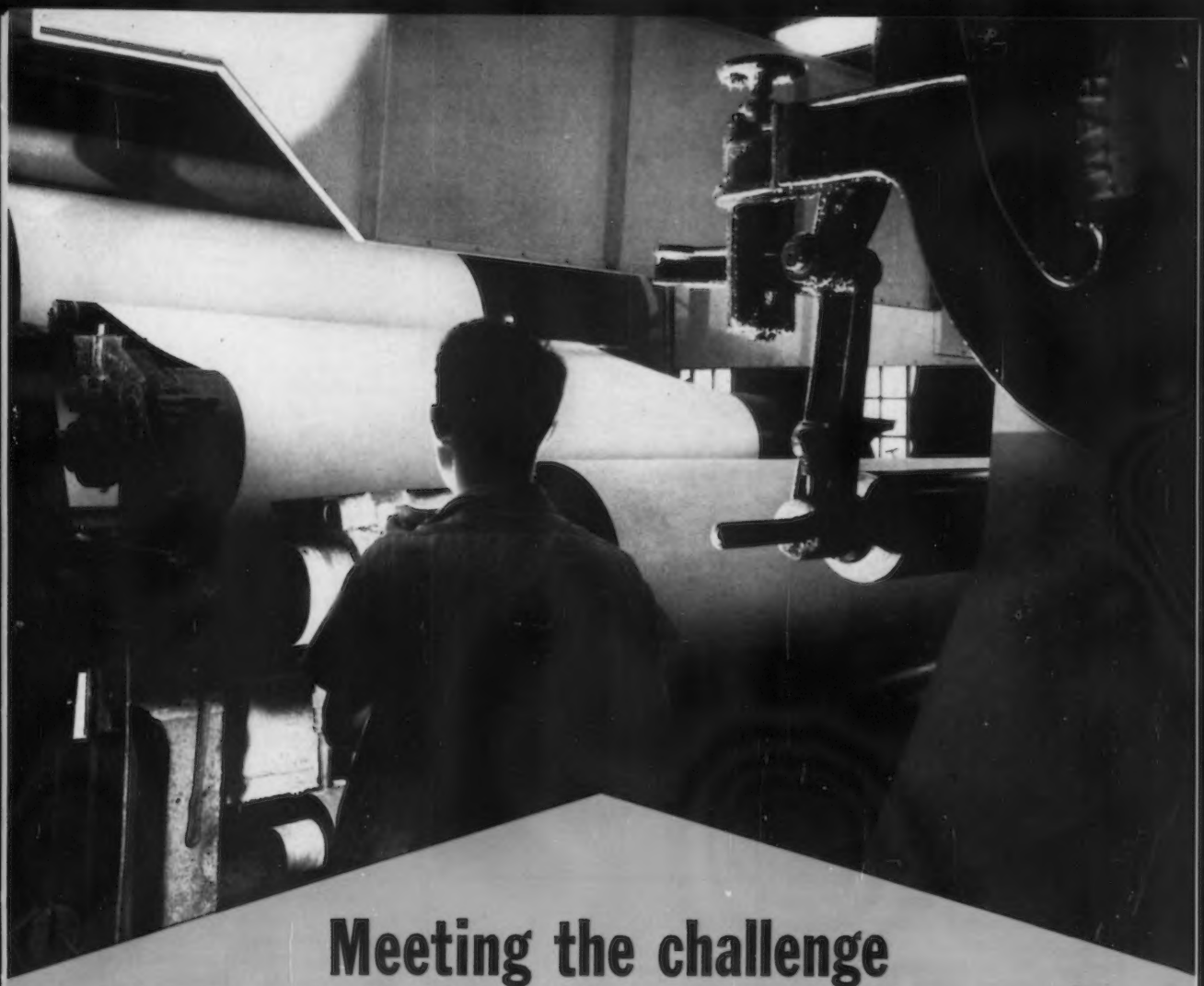
A spectacular four-alarm fire on March 31 that could be seen for miles burned out the upper floors of a warehouse on the waterfront in Philadelphia, Pa., used to store paper cups, twine and other paper goods sold by the Girard Paper & Twine Co. A large quantity of paper goods was destroyed by flames. About 200 firemen battled the blaze after a passerby saw fire behind windows on the second and third floors of the five-story brick building and sounded an alarm.

Among other firms occupying the building is the Dennis Games Co., distributors of novelty cardboard games, which also suffered heavy damage.

Dennison's Baker Retires After 52 Years' Service

A career of 52 years' service with the Dennison Manufacturing Co. of Framingham, Mass., ended on March 31 with the retirement of Roy Baker.

Mr. Baker, now 69, started as an order clerk at Dennison's Chicago retail store at the age of 16.



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Accuracy of Paper Mill Turbine Governing Systems and Effect of Speed Range

A. M. Dryer

Turbine Design Engr., Small Turbine Dept., General Electric Co.

In order to discuss this subject intelligently, we must first define our terms. Accuracy, first of all, is the measure of the governor's ability to control speed variation.

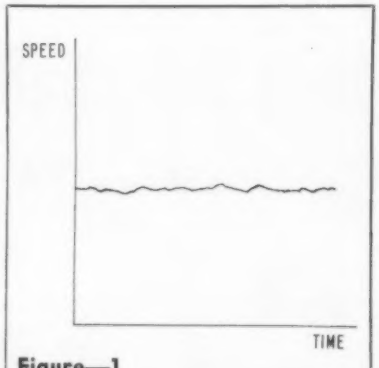
NEMA Standard TU-5-108 defines speed variation as "the total magnitude of speed change or fluctuation from the speed setting. This characteristic includes deadband and sustained oscillations." "Deadband" according to the standard, "is the characteristic of the governing system which is commonly referred to as wander. It is the insensitivity of the governing system and is defined as the total speed change during which there is no resultant change in the position of the governing valve (s) to compensate for the speed change." "Wander" is shown in Figure 1.

Speed oscillations, on the other hand "are the characteristics of the speed-governing system commonly referred to as "hunt." The ability of the governing system to keep sustained oscillations to minimum is measured by its stability." Hunt is illustrated in Figure 2.

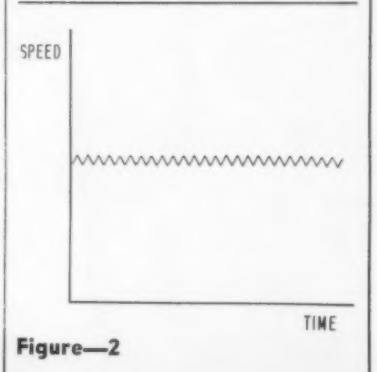
This difference in type of speed variation is emphasized because, unfortunately, the means of reducing the one type generally increases the other, so the resultant system must be a compromise.

First of all, we must accept the fact that in order to make a correction, there must be a speed change. This is true of all systems, whether electric, hydraulic or mechanical and regardless of the type of stabilizing.

In Figure 3, consider the force required to lift the valve (1) from the seat (2). If the seating diameter is 3" and the steam pressure is 600 p.s.i.g., the resultant force is about 4000 lb. To lift this valve, we might use the cylinder



Figure—1



Figure—2

Pt. (3) operating through a linkage. If the system oil pressure is 50 p.s.i.g. and we allow ourselves, say 20 percent of this to lift this valve, our cylinder must be 16" in diameter, if the valve is spaced halfway between the piston and pivot point.

We use pilot valves to control flow to this cylinder. Since the operation of the pilot valve is the key to the whole analysis, we'll go over this once more. In Figure 4, we feed pressure oil to the upper grove (A) in the bushing (1) and pipe the lower groove (B) to an open drain. For a moment, let us assume that the edges of the valve line up exactly with the edges of the bushing. Under these conditions, the same amount of oil leaks through the clearances at A and B so that the pressure at C is approximately one-half supply pressure. Suppose now we raise the pilot valve. This increases the clearance at A and decreases it at B. Oil now flows in easier than it flows out and the pressure at C increases. If the pilot valve travels downward, the opposite happens, and the pressure at C decreases.

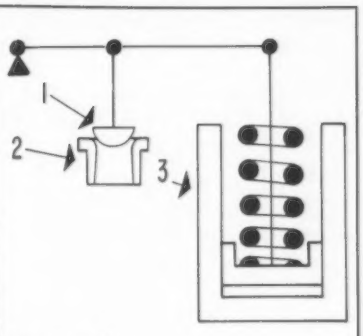
If we now add a governor to these components, we can form a governing system. One such governor is shown in Figure 5. When the governor assembly spins on shaft (5) the weights move outward due to centrifugal force thereby pulling the collar (4) downward against the spring (2). A typical governor might be so designed that a speed change of 5 percent at normal operating speed of 1500 r.p.m. moves the collar .1". Let's also assume that the same

speed change will produce the same change in travel regardless of the actual governor speed.

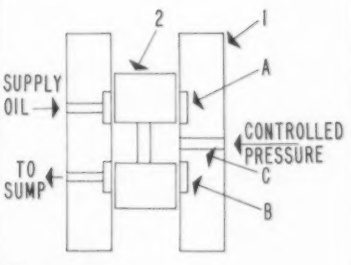
With these components we can build a governing system with parts arranged as in Figure 6. As in previous illustrations, the piston (2), by using oil controlled by the pilot valve (4) raises the valve (1). By connecting the governor (3) to the pilot valve (4), we control the flow of oil by speed.

Now let us see how this system looks with regard to deadband. Assume that we are running at a load point such that any increase at all will require the valve in question to open. For instance, the condition of the stock forces us to run the paper machine at a slightly higher speed. Before the turbine can produce this extra load, it must open this valve. We said before that we must increase the pressure under the piston 20 percent or 10 p.s.i.g. to generate the necessary force. This can only be done by moving the pilot valve, and since the pilot valve is connected to the governor, there must be a speed change How much must the speed change? Since a typical pilot valve produces 3 p.s.i. for 1 mil (or 1 thousandth) travel, the pilot valve must move about 3 mils. If 1/10" (or 100 mils) produces a 5 percent speed change, then 3 mils produces 3/100 X 5 percent or .15 percent. For a 1500 r.p.m. governor, this is 2.25 r.p.m. A little high by present standards but this is only a first try.

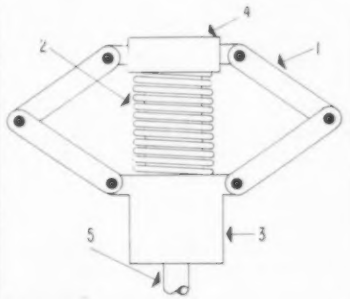
Suppose now we reduce speed to 1/5 of rated. We still must generate the same pressure change to lift this valve and, therefore, must change governor speed by the same amount. At this lower speed, the governor is now turning at 300 r.p.m. so a 2.25 r.p.m. change is 2.25/300 or .75 percent. By the same reasoning, operation at 1/10 rated speed, will result in a deadband



Figure—3



Figure—4



Figure—5

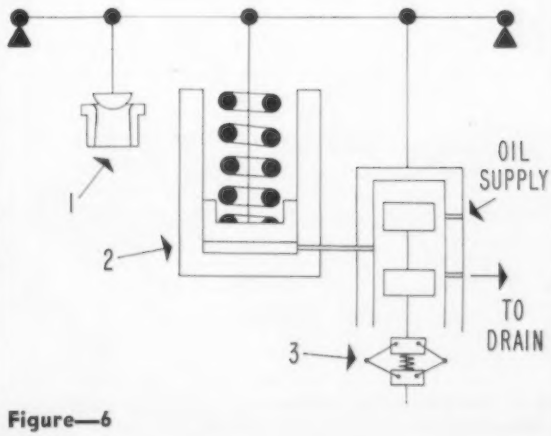
of 1.5 percent of running speed.

This governing system could be considerably improved to reduce the deadband, but no matter what we do, the fact remains that the deadband, when expressed as a percent of running speed, will increase in proportion to the speed range. This is shown in Figure 7.

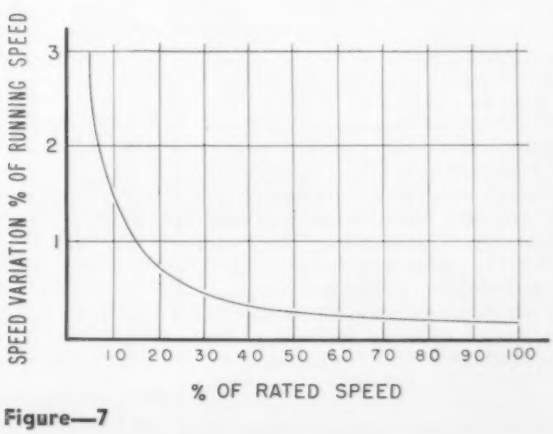
There are many means by which we can reduce this deadband. Referring to Figure 6 again, we recognize that to reduce deadband, we could reduce the amount of pressure change required to crack the valve. One way to do this would be to reduce the valve force. This can be done by using more valves, but the gain is quickly reduced by practical considerations. Another way is to use double lift valves, as shown in Figure 8. The poppet valve (3) lifts first and allows some steam pressure to build up in the bowl (2). Then the larger outer valve (1) lifts, but against a smaller pressure difference. In this way we can and do reduce cracking forces to about 1/3 of what they were originally. (Figure D-7) Referring to Figure 6 again, what else can we do? We could increase the cylinder size. Changing from 16" diameter to 22½" diameter will reduce deadband 50 percent. Or we could move the cylinder farther out on the lever to increase its leverage. This will require a longer stroke in the cylinder.

All this sounds so easy that some of you think there must be a catch—well, there is. Remember that earlier I stated that speed variation was composed of two parts; deadband and periodic speed variation. So far we've only considered the first; let's investigate the second.

When a governing system is in operation, many things are happening at once, each affecting the other. The steam pouring past the valves supplies the power to turn the turbine, the tur-



Figure—6



Figure—7

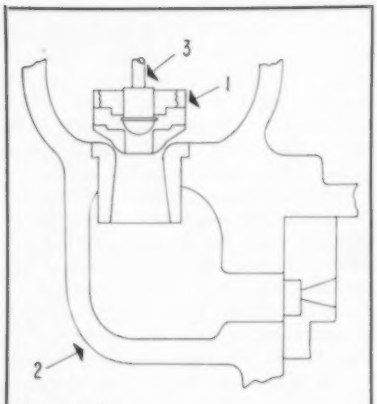


Figure 8—

bine turns the governor and the governor sets the valves. If the load dereases the turbine speeds up, the governor moves its pilot valve, the pilot valve changes the oil pressure under the piston, the piston closes the valves, the valves shut off the steam, and the load slows down the turbine. All these actions take place at varying rates. Suppose, for instance, we had a turbine which increased its speed 10 percent every second when full load was suddenly removed. A governing system which closed the valves in three seconds wouldn't be much use, to say the least. A number nearer to 1/10 of a second would be more reasonable, but to close the valves in this short interval, the system must pump oil to and from the cylinder and the bigger the cylinder, or the longer its stroke, the faster the oil must move. Suppose the system closes the valves just a little too slow. Then when it gets the valves set to the new position and finds the speed a little high, it closes the valve some more. Eventually, the turbine slows down, but since the valves are closed too much, it slows down too far, the valves open a little and the speed seesaws back and forth. Sooner or later we come to a point where we must compromise between the larger sizes needed for deadband and the smaller sizes need for speed.

Remember how the deadband increased as we increased the speed range? Unfortunately, we have a similar problem with stability. Stability, by its previous definition, is the ability of the governing system to keep sustained oscillations to a minimum. At lower speeds the system must be even faster to control these sustained oscillations. As you expected, when we make this final modification, we further increase the deadband at the lower speeds.

Closely associated with this problem is the amount of speed deviation when load is suddenly applied. Figure 9 shows the response characteristics of a turbine driving a paper machine at 1800 f.p.m. for three different control settings.

The upper curve shows a system in which the speed deviates only ½ percent when a large dryer section is suddenly clutched in. The speed oscillated several times and finally settled down to a fairly good steady state speed variation.

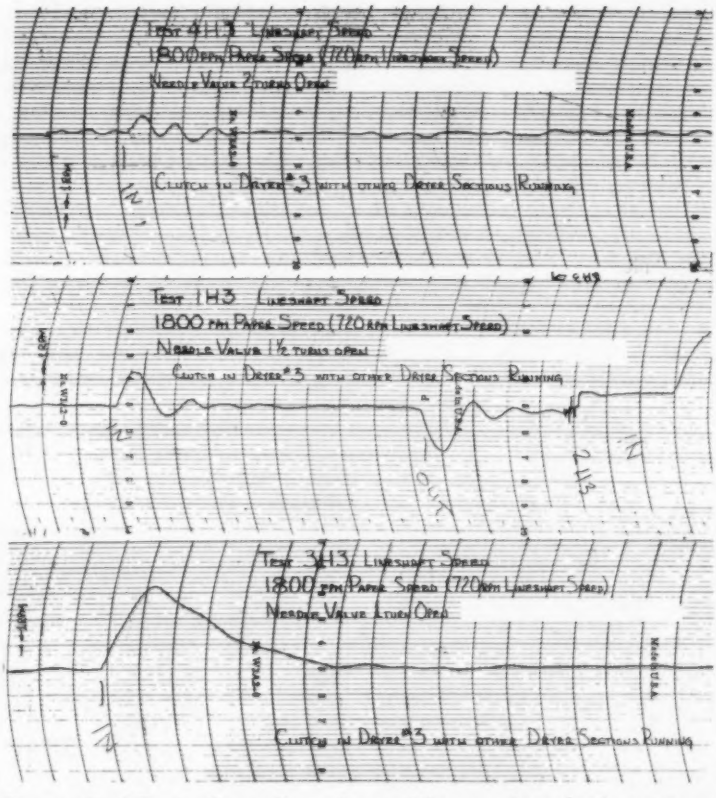

Test 1H3 Lineshaft Speed
1800 fpm Paper Speed (720 rpm Lineshaft Speed)
Needle Valve 2 turns Open
Clutch in Dryer #3 with other Dryer Sections Running
Test 1H3 Lineshaft Speed
1800 fpm Paper Speed (720 rpm Lineshaft Speed)
Needle Valve 1½ turns Open
Clutch in Dryer #3 with other Dryer Sections Running
Test 3H3 Lineshaft Speed
1800 fpm Paper Speed (720 rpm Lineshaft Speed)
Needle Valve 1 turn Open
Clutch in Dryer #3 with other Dryer Sections Running

Figure 9—Effect of needle valve setting on transient response 1800 f.p.m. paper speed.

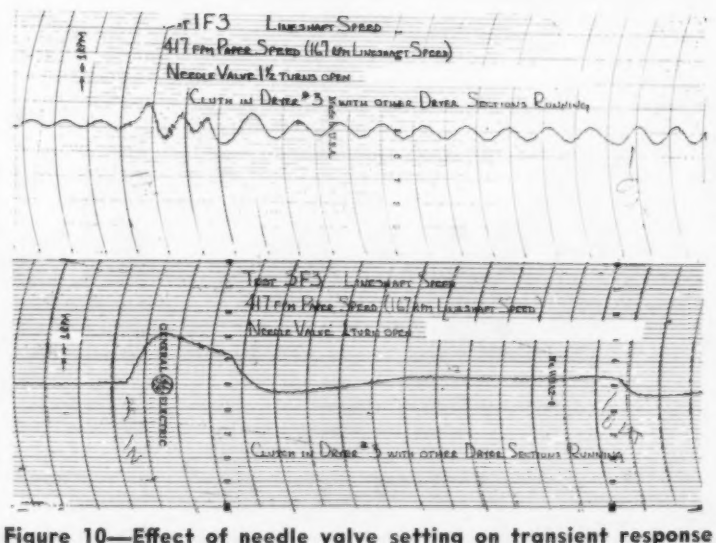

1F3 Lineshaft Speed
417 fpm Paper Speed (167 rpm Lineshaft Speed)
Needle Valve 1½ turns open
Clutch in Dryer #3 with other Dryer Sections Running
3F3 Lineshaft Speed
417 fpm Paper Speed (167 rpm Lineshaft Speed)
Needle Valve 1 turn open
Clutch in Dryer #3 with other Dryer Sections Running

Figure 10—Effect of needle valve setting on transient response 417 f.p.m. paper speed.

The middle curve shows the same system set for a slightly different response. Now there is almost a 1 percent speed deviation for the same load change but the transient settles out more rapidly. This is an almost ideal response characteristic.

The bottom curve shows the same system set for a slower response. The speed deviation now reaches almost 2 percent and returns with no oscillation. This is the typical response overdamped system.

If there were no further considerations, we would design the control system for the response of the middle curve, it being the best compromise between speed deviation, rate of return and steady state variation. However, there are further considerations, and one of them is speed range. Figure 10 shows the response characteristics of the same turbine and paper machine with the speed reduced to 417 f.p.m. or to between 1/4 and 1/5 of the former speed. You will note that this time we show only two curves. The system was too unstable when set for the top condition. With the system set for our previous optimum, we now have a steady state oscillation of 3 r.p.m. or about ½ percent of running speed. When we reset the system to the response characteristic shown in bottom curve of the previous illustration, we return to stable operation.

Figures 11 and 12 compare these same curves in another manner. Now instead of showing the effect of changing control setting while holding speed constant, we shall illustrate the effect of speed on a given control setting. Figure 11 shows the system set for optimum response at 1800 f.p.m. With the speed reduced to 417 f.p.m., the system borders on instability. Figure 12 shows the best compromise for both high and low speed operation. The system is slightly overdamped at low speed and definitely overdamped at high speed.

You will note that I said "overdamped" in both cases. If there were no further considerations, we wouldn't have adjusted the system that way. This brings us to moment of inertia, or "flywheel effect" and its effect on speed variation.

The old steam engines all had flywheels, because the power they delivered to the shaft was really a series of pulses. Since the load was constant, these power pulses resulted in speed pulsations or variations. A given flywheel requires a given power to change its speed. If the flywheel is made large enough, the power pulsations will be too small to change the speed, the output shaft speed will be constant. This is good. The unfortunate part is that now we need a large change in power to change the speed when we want it to change.

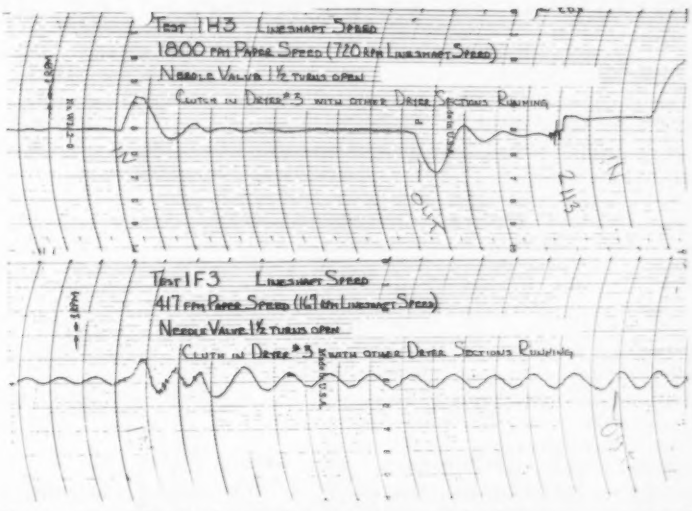

Test 1H3 Lineshaft Speed
1800 fpm Paper Speed (720 rpm Lineshaft Speed)
Needle Valve 1½ turns open
Clutch in Dryer #3 with other Dryer Sections Running
Test 1F3 Lineshaft Speed
417 fpm Paper Speed (167 rpm Lineshaft Speed)
Needle Valve 1½ turns open
Clutch in Dryer #3 with other Dryer Sections Running

Figure 11—Effect of speed range on speed of response controls set for optimum response at 1800 f.p.m.

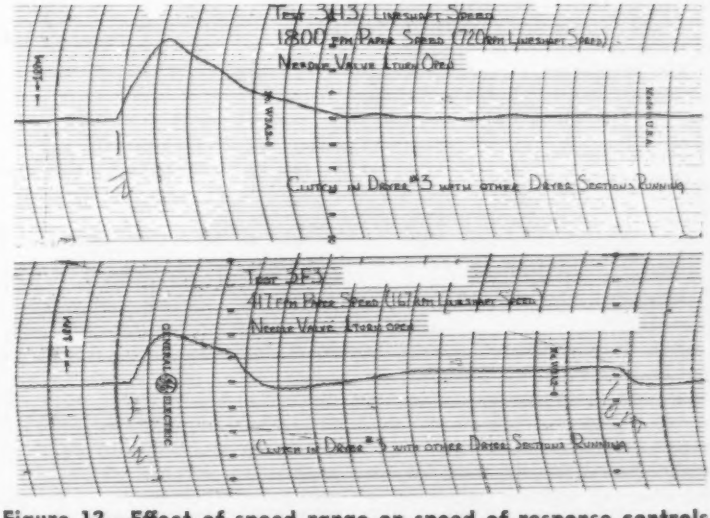

Test 3H3 Lineshaft Speed
1800 fpm Paper Speed (720 rpm Lineshaft Speed)
Needle Valve 1½ turns Open
Clutch in Dryer #3 with other Dryer Sections Running
Test 3F3
417 fpm Paper Speed (167 rpm Lineshaft Speed)
Needle Valve 1½ turns Open
Clutch in Dryer #3 with other Dryer Sections Running

Figure 12—Effect of speed range on speed of response controls set for best overall system response at all speeds.

On paper machine drives, the load is really like two flywheels, one large and one tremendous. If the system is designed to run with good stability when driving the lineshaft only, then when the tremendous inertia of the full paper machine is clutched in, it must necessarily be overdamped and somewhat slow.

From what I have said, you can see how the "further considerations" force the system designer to compromise. He can design the system without knowing the load WR^2, for instance, but will probably make it conservatively slow. At the expense of considerable work, this information can be obtained and the designers can come up with a much faster stable system.

This is an example of the improvement that can be made through cooperative effort. As time goes on, the Small Steam Turbine Department is sure this co-operation will lead to the development of an overall control system which will provide speed control considered impractical today.

Cathodic Protection In Pulp & Paper Mills

Joseph A. Lehmann

Division Engineer, Electro Rust-Proofing Corp.

Widespread recognition of cathodic protection as one of the means for controlling corrosion on all types of buried and submerged metal structures has directed increasing interest toward its application at pulp and paper mills.

Because of manufacturing methods and equipment peculiar to the paper industry it is not uncommon to find that many plants are needlessly spending thousands of dollars annually because of corrosion. Frequently corrosion failures not only cause large expenditures for replacement of equipment, but also result in costs due to "down-time" and loss of productive capacity. Much of this waste can be eliminated by the proper use of the cathodic protection principle.

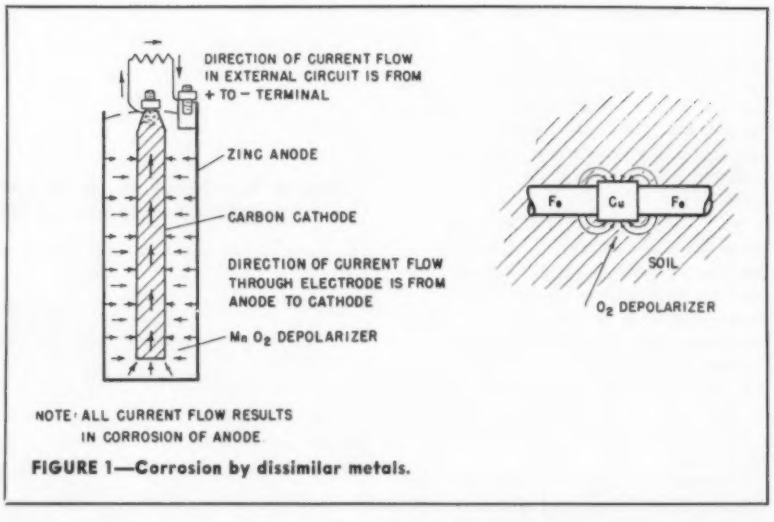

DIRECTION OF CURRENT FLOW IN EXTERNAL CIRCUIT IS FROM + TO − TERMINAL
ZINC ANODE
CARBON CATHODE
DIRECTION OF CURRENT FLOW THROUGH ELECTRODE IS FROM ANODE TO CATHODE
Mn O2 DEPOLARIZER
NOTE: ALL CURRENT FLOW RESULTS IN CORROSION OF ANODE
Fe
Cu
Fe
SOIL
O2 DEPOLARIZER

FIGURE 1—Corrosion by dissimilar metals.

Now Has Wider Range

Intense corrosive environments and complex physical conditions have, in the past, discouraged the application of cathodic protection to paper mill equipment. However, fundamentals of cathodic protection are now well established. Availability of more suitable engineering materials for cathodic protection systems encourage its use in corrosion problems heretofore considered as doubtful applications.

Before we deal with some of the applications of cathodic protection it is well to discuss, briefly, the electrochemical aspects of the corrosion cell.

The fundamental causes of galvanic corrosion are simple. If two different metals, say a copper pipe and a black iron pipe, buried in a moist soil (or submerged in water) are metalically connected together, an electric current will flow. This current will flow from the iron pipe into the soil, through the soil to the copper pipe, and through the metallic connection back to the iron pipe, thus completing the circuit. This electric current is the result of electro chemical action between the surfaces of the pipes and the chemicals in the soil. Corrosion of the iron pipe occurs due to the flow of electrical current from its surface into the soil (or electrolyte). A protective effect is experienced on the surface of the copper pipe. (See Figure 1.)

This same electro chemical action is the basis for the common dry cell battery. Current is "generated" merely by the action between the zinc battery container and a center carbon rod. In the dry cell battery the space between the center rod and the zinc container is filled with selected materials so as to provide an excellent electrolyte, and also prevent polarization of the center carbon rod. As in the case of the copper pipe connected to the black iron pipe, when a wire is connected between the carbon rod and the zinc battery container, a current will flow through the wire from the carbon rod, or positive terminal of the battery, to the zinc container, or negative terminal of the battery (this is called the external circuit). Within the battery for the internal circuit) the current flow is from the zinc through the electrolyte to the carbon rod. Constant use of a dry cell battery will cause corrosion of the zinc container and eventually the electrolyte will leak and the battery becomes useless. (See Figure 1.)

It should be noted that corrosion always takes place at the point or area where current leaves a metal surface and enters an electrolyte. This point or area is called the anode. Corrosion is not experienced on the area where current is collected on a metal surface from the electrolyte. This area is called the cathode.

Corrosion Between Like Surfaces

Anodes and cathodes not only occur when dissimilar metals are inter-connected within an electrolyte, but also occur on a single type metal due to variations in the environment and metal itself. For example, when a pipe line crosses alternately wet and dry soils, the steel surfaces in the wet areas become anodic to those surfaces in the dry areas. Thus corrosion will take place even though the same kind of metal is used throughout. (See Figure 2.) Other types of differences in the electrolyte such as variations in oxygen concentration, differences in soil or water composition, temperature variations, velocity variations (when the electrolyte consists of flowing liquid), nonuniformity of surface conditions, etc. can similarly produce anodic and cathodic areas.

The corrosion systems of anodes and cathodes are generally classified in two major categories:

1—Local cell; A cell, the emf of which is due to differences of potential between areas on a metallic surface in an electrolyte. The potential differences may be due to inclusions, lack of homogeneity, varying concentration of the solution with respect to oxygen or metal ions, etc. *Local action* is defined as corrosion caused by the flow of electric current between points on a metal surface.

2—Long-line cells (or current); current (positive electricity) flowing through the electrolyte from an anodic to a cathodic *area* which returns along the metallic structure. Usually used only where the *areas* are separated by considerable distance. (See Figure 2 and 3.)

The local cell corrosion action is usually highly concentrated and exhibits itself in the form of pitting on the metal surface. In any corroding system the effects of the two types of cells are frequently superimposed one upon another. The long line corrosion cells are easily overcome by cathodic protection while the concentrated local cell action frequently requires high protective current densities and more exacting engineering to control its effects.

How Cathodic Principle Is Applied

Considering the fact that corrosion occurs at the anode (where current leaves the metal surface and enters the electrolyte) and no corrosion occurs at the cathode[1] (where current is collected upon the metal surface from the electrolyte) the theory of cathodic protection is simplified. The structure which we wish to protect is merely made cathodic over its entire surface area. This is done by placing some external current source, such as an auxiliary anode, in the electrolyte from which current is *driven* and collected on the protected structure's surface. The design of specific cathodic protection systems is not quite so simple. (See Appendix "A" for electrical analysis of corrosion and cathodic protection.)

Choosing the Right Anode Material

One of the most important problems encountered in the design of any cathodic protection system is the choice of material to be used for the *auxiliary anode*. Cathodic protection anodes are divided into two major classifications:

1—Galvanic or sacrificial anodes

2—Anodes for use with *impressed* currents, or non-sacrificial anodes.

[1] Except in special instances where *cathodic corrosion* may occur, cathodic corrosion is corrosion due to the development of alkalinity by a reaction at the cathode—sometimes experienced with aluminum, zinc and lead. Alkalinity from this source may also affect paints vulnerable to alkali attack.

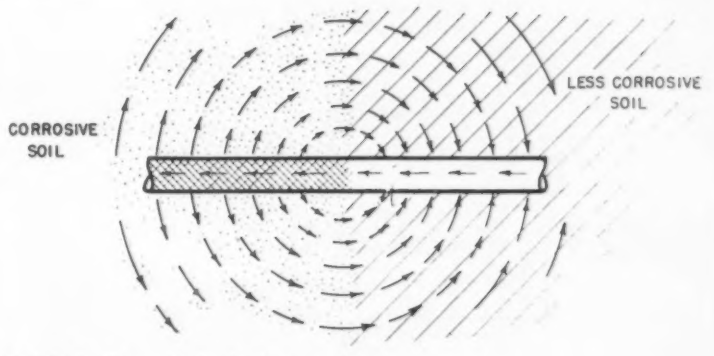


FIGURE 2—Corrosion by dissimilar soils.

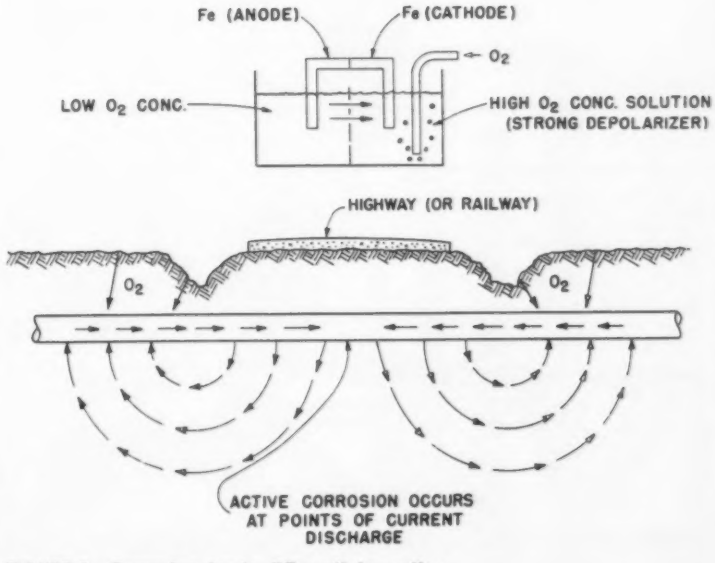


FIGURE 3—Corrosion due to differential aeration.

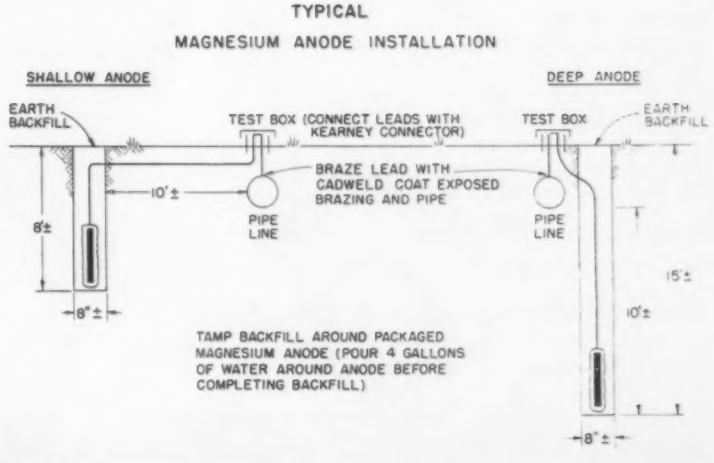


FIGURE 4

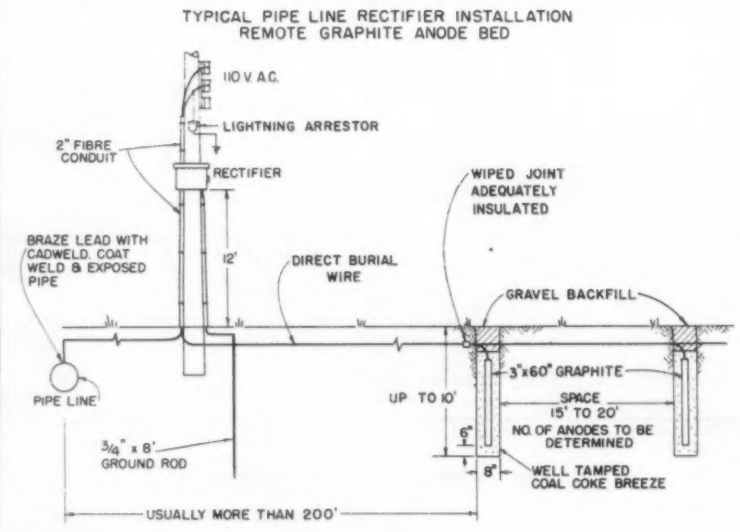


FIGURE 5

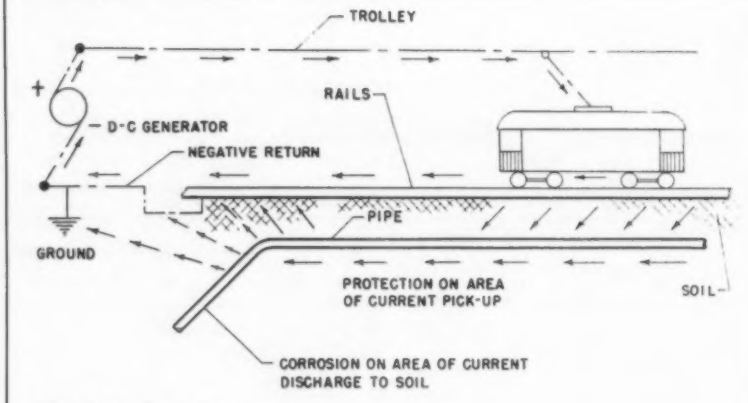


FIGURE 6—Electrolysis.

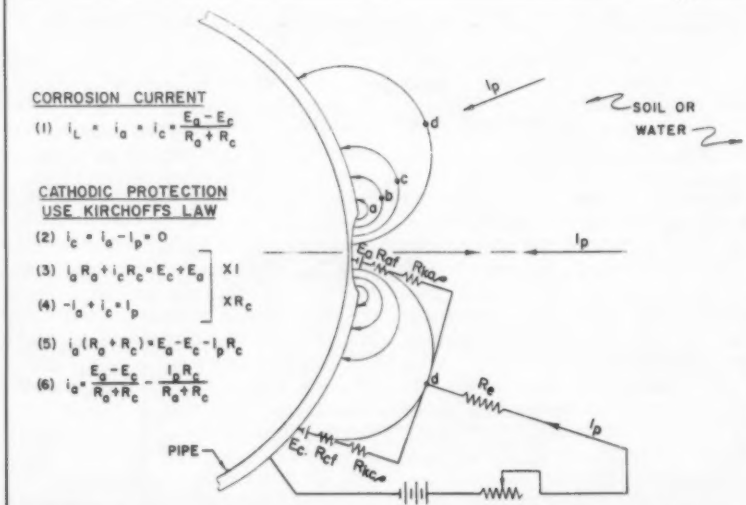

CORROSION CURRENT
(1) $i_L = i_a = i_c = \frac{E_a - E_c}{R_a + R_c}$
CATHODIC PROTECTION USE KIRCHOFFS LAW
(2) $i_c = I_a - I_p = 0$
(3) $I_a R_a + i_c R_c = E_c + E_a$ X I
(4) $-I_a + i_c = I_p$ X R_c
(5) $i_a(R_a + R_c) = E_a - E_c - I_p R_c$
(6) $i_a = \frac{E_a - E_c}{R_a + R_c} - \frac{I_p R_c}{R_a + R_c}$
I_p
SOIL OR WATER
d
c
b
a
E_a Raf Rac
I_p
d
R_e
I_p
PIPE
Ec. Rcf Rac

FIGURE 7—Corrosion current flow lines and equivalent cathodic protection circuit.

When using galvanic anodes, the corrosion engineer merely utilizes the principle of corrosion between dissimilar metals to obtain the protective current. As stated previously, when black iron or steel is electrically connected to copper and both are placed in an electrolyte, a current will flow from the steel through the electrolyte to the copper, therefore the steel is *protecting* the copper. This protective effect is produced because steel is more electro-negative than copper in the electromotive series (see Appendix "B"). Therefore, we may conclude that any metal may be cathodically protected by coupling it with a metal more electro-negative than itself. For example, zinc, aluminum, and magnesium may be readily used to protect such metals as steel, lead, and copper. Naturally in the majority of instances in industry we are attempting to protect steel or other alloys of iron, thus zinc, aluminum and magnesium are frequently used as galvanic anodes.

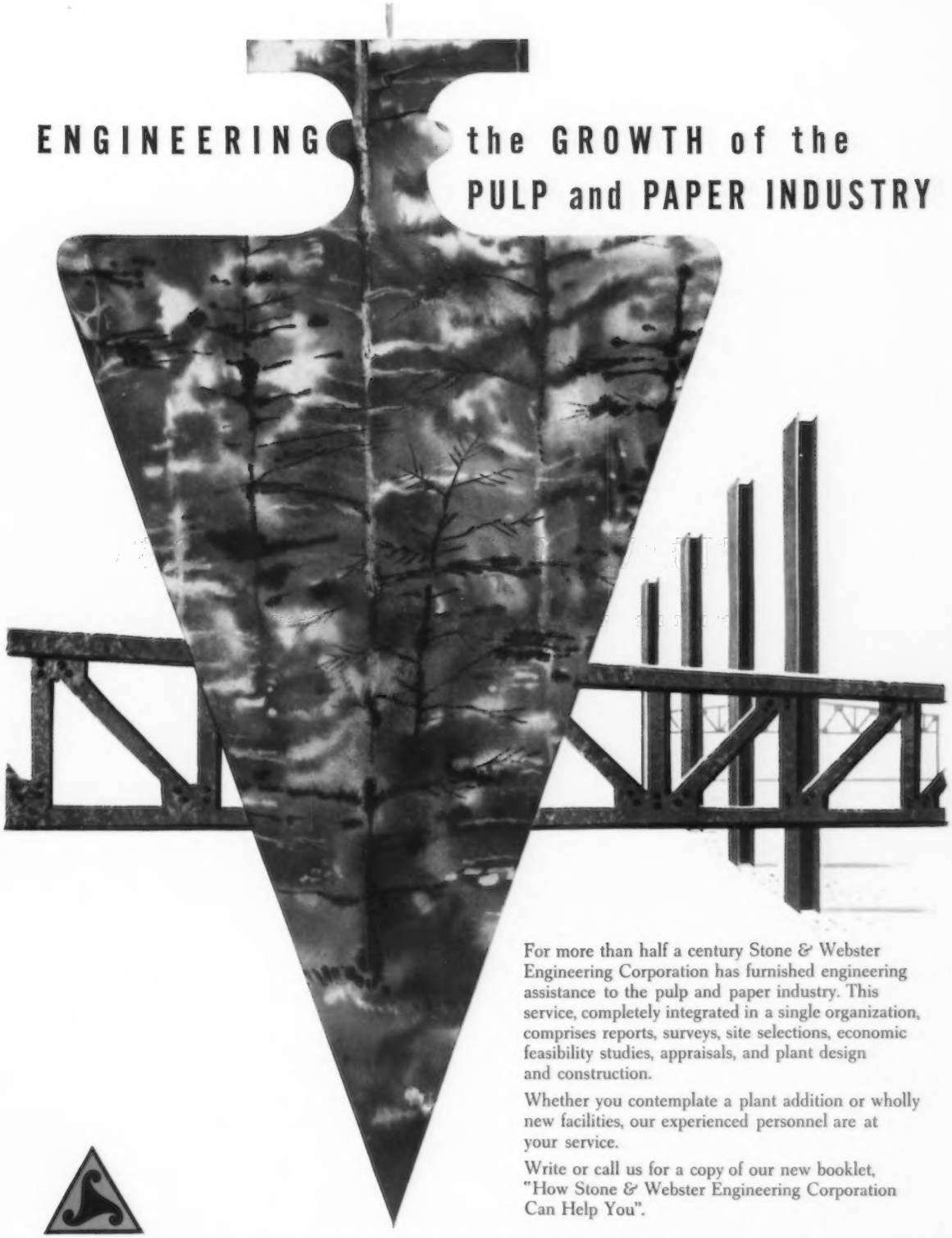
By observing the difference in potential between steel or iron the metals frequently used for galvanic anodes, it becomes evident that usually not more than 0.4 to 1.2 volts can be produced. Therefore, when the electrolyte resistance is high or if protective current requirements are large, *impressed* currents may be utilized for cathodic protection.[2] Usually the source for such impressed currents is a selenium stack rectifier.[3] The anodes used in such systems are designed of materials to fit the specific environmental conditions. Usually such anodes are made of aluminum, carbon, graphite, platinum, and high silicon (14.5 percent) cast iron. These particular materials are generally used for impressed current anodes due to their lack of undesirable corrosion by-products or relatively slow deterioration rate.

Any anodes utilized in the cathodic protection system must be ultimately replaced. When utilizing galvanic anodes the expected life of the anode can range anywhere from one to twenty years or more, depending on the specific characteristics of the individual cathodic protection systems. If aluminum anodes are used in an impressed current system, the life of the anode material is generally designed to be from one to five years. Utilizing graphite or high silicon cast iron, cathodic protection systems can be designed to have an effective anode life of from five to thirty years or more. When selecting the type

[2] There are exceptions to this depending on power availability, particular design requirements, etc.

[3] Newly developed silicon cells are becoming more popular as cathodic protection rectifying elements. These new cells permit a 20% to 50% reduction in size and 10% to 40% reduction in weight of the rectifier unit as compared with selenium plates.

ENGINEERING the GROWTH of the PULP and PAPER INDUSTRY



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of anode to be used in any particular cathodic protection system, economics as well as protective current requirements are the factors which dictate the choice. (See Figure 4 and Figure 5.)

Determining Current Requirement

Probably the most perplexing problem encountered in the design of a cathodic protection system is the determination of the current required for adequate protection. There is no basic rule of thumb that can be applied in this regard. The only feasible way to determine such requirements is by suitable field investigations. To illustrate the fallacy in guessing at current requirements, experience has shown that to protect a bare steel structure in soil, current requirements may range from 1 to 3 ma/ft², whereas to protect the same bare steel in sea water, the current requirements would be from 5 to 8 ma/ft², while a well coated steel structure in soil may easily be protected at a current density as low as 0.01 ma/ft² or less. Frequently the velocities of liquid electrolytes over a metal surface have a tremendous bearing on the current required for proper corrosion control. It is not uncommon to utilize current densities as high as 100 ma/ft² to protect the interior surfaces of condenser and heat exchanger water boxes.

It is obvious that current requirements are greatly minimized when cathodic protection is utilized on structures which have been painted or coated with corrosion resistive materials. Among the resistive coating with which cathodic protection is often used are vinyl coatings and glass fiber and/or asbestos-reinforced coal tar enamels. Cathodic protection can and has been used to protect bare metal structures. However, in many instances the high protective current and large equipment requirements would eliminate consideration of cathodic protection by economic and/or practical factors.

Paper and Pulp Mill Uses

In recent years cathodic protection has been utilized on many structures throughout paper mills to control corrosion losses and thus produce profits. It is common practice to use such protection on the interior of water storage tanks, accelators (equipment for the treatment of white water), buried pipe lines and electrical cables, water intake structures (traveling screens), condenser and heat exchanger water boxes, etc. These are only some of the possible applications.

Galvanic corrosion is not the only effect which may be causing destruction of metallic structures. Rapid and extensive corrosion of buried pipe lines and electrical cables can occur when leakage from d.c. eletrical equipment (such as motors, rectifiers, and welding generators) is prevalent. This has been found to be a major problem in many large industrial plants such as pulp and paper mills. These stray currents use buried pipe lines and cables as a return or negative bus. Where such currents are picked up or collected by the buried structures a protective effect is experienced. However, if these stray currents are discharged from the buried structures severe corrosion or electrolysis is experienced. It is not uncommon to find that in most plants anywhere from 20 to 30 portable welding generators may be in operation at a single time. Most of these generators range in capacity from 300 to 500 amperes. Considering the fact that for every 1 ampere discharged from iron 20 lb. of metal will be lost in a single year (70 lb. in the case of lead) serious deterioration can be experienced. This should be kept in mind whenever extensive welding operations are contemplated. While constructing or repairing above-ground structures you may very well be seriously damaging your underground facilities. Due to these large stray currents some operators have experienced failure of their pipe lines and cables within a period of a few weeks, or even several days. This problem can generally be overcome by furnishing a suitable low resistance return path for the stray currents. (See Figure 6 and 8.)

Field investigations are continually in progress to determine the technical and economic feasibility of utilizing the principles of cathodic protection to control corrosion on a wide assortment of machines and equipment common to the pulp and paper industry. Such testing work may ultimately reveal practical methods of retarding or preventing corrosion of such structures as fourdrinier wires, cylinder mold wire, pulp masher wire, etc. Only through cooperative testing with the industry can these complex corrosion problems be resolved.

When endeavoring to overcome corrosion problems it should be remembered that cathodic protection, although a very useful tool, is not a cure-all. Thorough consideration should be given to the use of protective coatings, chemical treatment (inhibitors), and the use of proper alloys and plastics. Utilizing all of the known means to fight corrosion, there is no dobut that the pulp and paper industry can realize even greater savings and more profits in the years to come.

APPENDIX "A"

Electrical Analysis of Corrosion and Cathodic Protection

A concept helpful in understanding the relationship between potential, resistance, and current found in a natural electrochemical corrosion cell and in the application of cathodic protection can be established by the use of Kirchoff's laws.

The local action current I_x in the natural corrosion cell is then expressed as follows:

$$I_x = I_a = I_c = (E_a - E_c)/(R_a + R_c) \quad (1)$$

Where E_a = anode potential
E_c = cathode potential
R_a = anode resistance
R_c = cathode resistance
I_a = anode current
I_c = cathode current
I_x = local action current

E_a and E_c are the polarized potentials of the local anode and cathode respectively, and represents the open circuit potential and the complex effect of the

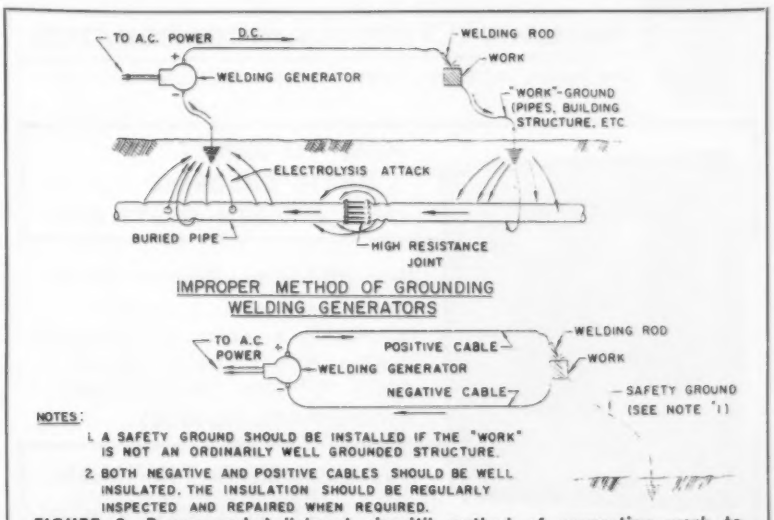
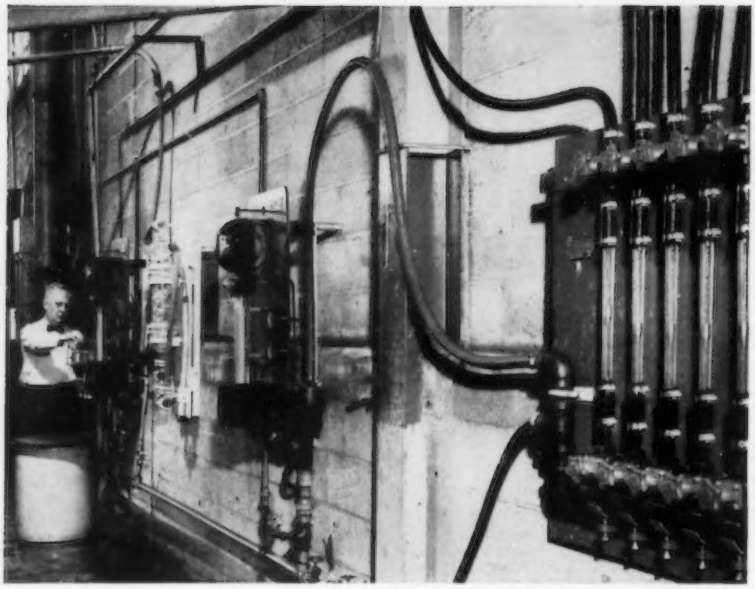

TO A.C. POWER
D.C.
WELDING GENERATOR
WELDING ROD
WORK
"WORK"-GROUND (PIPES, BUILDING STRUCTURE, ETC
ELECTROLYSIS ATTACK
BURIED PIPE
HIGH RESISTANCE JOINT
IMPROPER METHOD OF GROUNDING WELDING GENERATORS
TO A.C. POWER
POSITIVE CABLE
WELDING GENERATOR
NEGATIVE CABLE
WELDING ROD
WORK
SAFETY GROUND (SEE NOTE 1)
NOTES:
1. A SAFETY GROUND SHOULD BE INSTALLED IF THE "WORK" IS NOT AN ORDINARILY WELL GROUNDED STRUCTURE.
2. BOTH NEGATIVE AND POSITIVE CABLES SHOULD BE WELL INSULATED. THE INSULATION SHOULD BE REGULARLY INSPECTED AND REPAIRED WHEN REQUIRED.

FIGURE 8—Recommended "closed circuit" method of connecting work to welding generators.



Mr. Albert Jacobs, Plant Supt., inspects W&T Slime Control Equipment at Electric City Paper Mills, Inc., N. Tonawanda, N. Y.

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Electric City Paper Mills, Inc. recently installed new W&T chlorination equipment and eliminated slime in their paper machines. They report, "For years we have been troubled with a very bad slime condition and have spent a considerable amount of money trying to eliminate it. Not until we installed W&T equipment did we realize complete slime control. This has been accomplished at a saving in cost to us of more than 50%. Not only did we save money but we are getting desired results."

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e.m.f. developed by concentration polarization. The IR drop form of polarization caused by the resistance element is considered separately.

The effect of an applied protective current I_p upon the corrosion current flowing into the electrolyte from the anode (1 amp./yr. represents about 20 lb. of iron) can be best understood when we assume that E_a, E_c, R_a & R_c are unchanged at the instant that the protective current is applied or interrupted.

$$I_a = (E_a - E_c)/(R_a + R_c) - I_p \; (R_c)/(R_a + R_c) \qquad (2)$$

Thus, it can be seen that the corroding anodic current I_a, at the instant protection is applied is equal to the local action current I_x less a portion of the protective current I_p which is determined by the function $R_c/R_a + R_c$. Protection is complete when $I = O$.

The protective current I_p for full protection is:

$$I_p = (1 + R_a/R_c) \; (E_a - E_c)/(R_a + R_c) \qquad (3)$$

A study of these relationships show that factors which increase the rate of depolarization will increase the local action current I_x in the natural corrosion cell as well as the protective current I_p needed for complete protection.

APPENDIX "B"

Electro-positive or noble metals	Half-cell potential in solution of own salts* (potential to a hydrogen reference electrode) Volts
Gold	+1.36 to 1.5
Carbon	+0.90
Platinum	+0.86
Silver	+0.80
Mercury	+0.80
Copper	+0.34 to 0.47
Copper sulphate electrode	+0.34
Hydrogen—as a reference electrode	0.0
Electro-negative or base metals	
Lead	—0.12
Tin	—0.14
Iron	—0.05 to 0.35
Rusty steel	—0.25 est.
Bright steel	—0.45 est.
Zinc	—0.77
Aluminum	—1.7
Magnesium	—2.4

*From handbook "Physics and Chemistry" 1943, p. 1368.

Presented at the Technical Conference sponsored by the Paper Sub-Committee, American Institute of Electrical Engineers, March 28-29, 1957, Atlanta, Ga.

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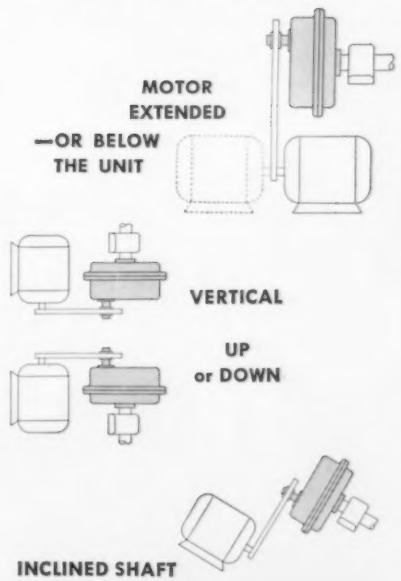
A FEW OF THE MANY POSSIBLE DRIVING ARRANGEMENTS



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These two Bauer Refiners are driven by Reliance 400 hp. A-c. Motors. The grinding action of the machines sets up heavy load factors on the motors.

RELIANCE motor design proved in new paper mill

Here is a 100 hp. Reliance Totally-Protected A-c. Motor doing a job under very adverse conditions. The water and pulp being sprayed on it is coming from a paper board machine, part of an installation that Crossett Paper Company recently built to produce bleached kraft board from hardwood and pine pulp.

But there is more to a Reliance Motor than just a good enclosure. Extra copper and iron, the best bearing lubrication system, tough, resistant insulation . . . these and many more features add up to designed durability, the one big feature that makes users, like Crossett, steady Reliance customers.

Call your Reliance representative and ask him to show you the Reliance extras. Fifteen minutes of your time now can save hours of machine down-time later.

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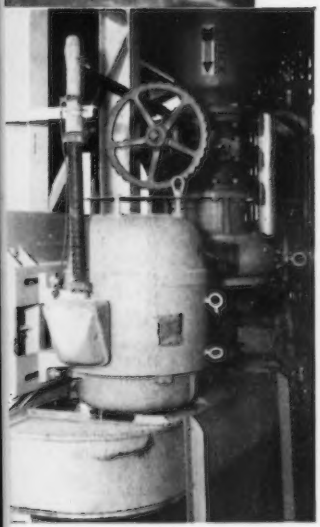
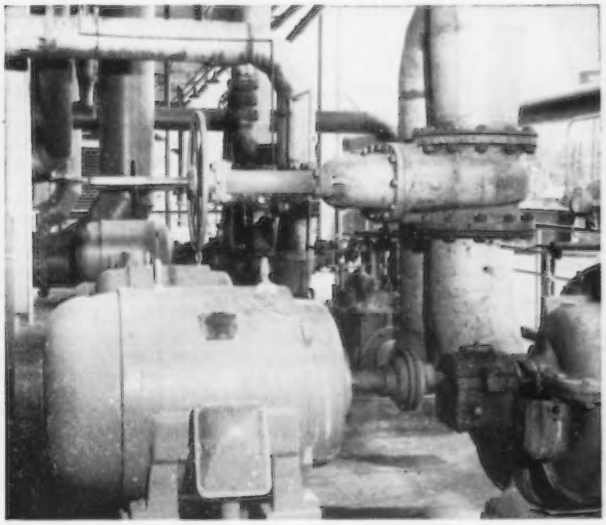
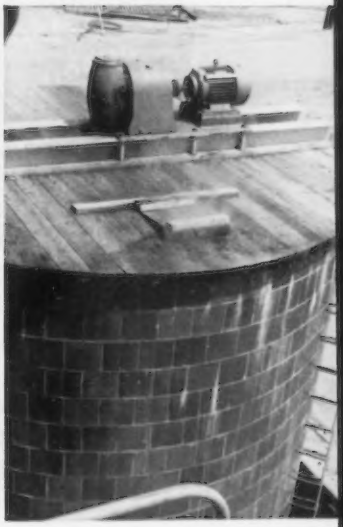
◀ Located under the head end of the board machine, this 100 hp. Reliance A-c. Motor operates a fan pump while periodically being drenched with water and pulp.



Reliance has frame designs for every application. Here is a 25 hp. foot mounted vertical motor driving a refined-stock pump. Other vertical designs include C-Face, D-Flange, and P-Base mountings.



This 60 hp., 1800 rpm and two 40 hp. 900 rpm Reliance A-c. Motors run white water pumps. Though reasonably sheltered from the elements, the motors are subjected to wide temperature changes.



In hard to reach spots like this two story high refined stock chest, Metermatic Bearing lubrication is very important. This new line 20 hp. Reliance A-c. Motor will operate the agitator for months without greasing.

NORTON

Grinding Wheels

Pulpstones

Grinding Machines

Refractories

Porous Mediums

Non-slip Tiles & Aggregates

Norbide Products

NORTON COMPANY

WORCESTER, MASS.

Behr-Manning Division, Troy, N. Y.

PRICES OF FIBERS

MARKET WOOD PULP

SECOND QUARTER CONTRACT PRICES PER SHORT AIR-DRY TON

	Delivered Basis		Varying Freight Allowances†		
	U.S.	Canadian	Swedish	Finnish	Norwegian
Groundwood	$82.50/ 90.00	$82.50/ 90.00	§$83.00/ 86.00§	§$92.00/ —	§$77.50/ 90.00
Kraft, Blchd.	152.00/155.00	155.00/ —	§155.00/ —		§155.00/ —
Kraft, Blchd. Hdwd.	150.00/ —		§137.00/ —		
Kraft, Semi-bleached	140.00/ —	135.00/140.00	§135.00/140.00§	*137.50/142.50	
Kraft, Unbl.	117.50/125.00	120.00/130.00	†125.00/130.00	125.00/ —	
Sulphite, Blchd.	150.00/ —	150.00/ —	*150.00/ —	*150.00/ —	145.00/147.50†
Sulphite, Unblchd.	130.00/ —	130.00/ —	†130.50/ —	*130.00/ —	
Sulphite, Unb'l. Gl'sn		129.00/ —	†129.00/ —		
Soda, Blchd.	142.50/145.00	145.00/ —			

§ On Dock Atlantic Ports. * Freight allowed.

NEW YORK RAG MARKET

New Domestic Cotton Cuttings
Delivered Mill Basis
PRICES NOMINAL

	Per 100 lbs.
No. 1 White Shirts	$13.50/$14.00
No. 1 Unblchd. Muslins	16.00/ 16.75
Blchd. & Unblchd. Underwears	15.00/ 15.50
No. 1 Light Silesias	7.00/ 7.50
No. 1 Light Blue Overalls	7.25/ 8.00
Percales	6.00/ 6.50
No. 1 Light Prints	5.00/ 5.50
Khaki Khakis	5.50/ 6.25
Cottonades	3.25/ 3.75
No. 1 Washables	2.50/ 2.75

Old Domestic Cotton Rags

(Prices to Dealers, f.o.b. Ship. Pt.)

	Per 100 lbs.
Mixed White	$3.00/$3.25
Cotton Pants & Overalls	2.00/ 2.25
Twos and Blues, Repacked	1.50/ 1.75
No. 2 Roofing	.60/ .70

COTTON LINTERS

Memphis Market
f.o.b. Oilmills

Week Ended April 4		Per 100 lbs.
Grade 1	n.a.	
2		$9.50/ $9.25
3	1 cut—felting	9.25/ 8.50
4		8.25/ 7.50
5		7.50/ 7.00
6		6.50/ 6.00
7		6.00/ 5.75

*Based on 73% cellulose.

Old Rope & Bagging

(Prices to Dealers, f.o.b. N.Y.)

	Per 100 lbs.
New Burlap Cuts	$5.75/$6.50
Scrap Burlap	4.50/ 5.25
Australian Wool Pouches	5.25/ 5.75
Gunny	5.50/ 6.25
No. 1 Domestic Manila Rope	7.75/ 8.25
No. 1 Foreign Manila Rope	6.25/ 6.50
Domestic Sisal Strings	4.25/ 4.50

WASTE PAPER MARKET

Mill Prices, f.o.b. Trucks Shipping Point — includes Brokerage

Those quotations are a partial indication of the price range on volume tonnage in each market on the date specified, as gathered from major dealers. SPECIAL PACKINGS AND SPOT TONNAGE NOT INCLUDED. Prices nominal.

	New York	Boston	Chicago	Los Angeles
	April 8	April 8	April 8	April 8
No. 1 Mixed Paper	$4.00/ 7.00	6.00/ 8.00	4.00/ —	12.00/ —
No. 1 News	11.00/ 13.00	11.00/ 13.00	14.00/ —	12.00/ —
Overissue News (Lg. size)	13.00/ 16.00	11.00/ 13.00	19.00/ —	14.00/ —
Old Wrappers	12.00/ 14.00	13.00/ 14.00	7.00/ —	14.00/ —
Old Corrugated Containers	15.00/ 16.00	15.00/ 16.00	18.00/ 19.00	18.00/ —
Super Resorted Kraft Paper	30.00/ 35.00	35.00/ 36.00	30.00/ —	45.00/ —
New Double Kr. Ld. Corr. Cuts	25.00/ 27.50	25.00/ 27.50	33.00/ —	30.00/ —
(Semi-chem. medium)	40.00/ 45.00	40.00/ 45.00	40.00/ 45.00	37.00/ 42.50
New 100% Kraft Corr. Cuts	50.00/ 55.00	50.00/ 55.00	55.00/ —	40.00/ —
New Br. Kraft, Env. Cuts	70.00/ 80.00	75.00/ 85.00	55.00/ —	45.00/ 50.00
New Br. Kr. Bag Waste Prntd.	55.00/ 60.00	60.00/ 65.00	50.00/ —	45.00/ 50.00
New Br. Kr. Bag Waste Unprntd	60.00/ 65.00	70.00/ 75.00	65.00/ —	45.00/ 50.00
No. 1 Groundwood Shvs.	25.00/ 35.00	25.00/ 35.00	24.00/ —	25.00/ 30.00
White Newsblanks	55.00/ 60.00	55.00/ 65.00	40.00/ —	55.00/ —
No. 1 Soft White Shvs.	55.00/ 65.00	70.00/ 75.00	60.00/ —	— / —
Super Soft White Shvs.	65.00/ 70.00	75.00/ 80.00	70.00/ —	— / —
Old. White Shvs.	90.00/100.00	100.00/105.00	85.00/ —	85.00/ 90.00
Old. White Env. Cuts	110.00/120.00	115.00/125.00	95.00/ —	100.00/110.00
Col. Tab. Cards	50.00/ 55.00	60.00/ 65.00	50.00/ —	30.00/ —
Manila Tab. Cards	65.00/ 75.00	75.00/ 80.00	70.00/ —	49.00/ —
No. 1 Col. Ledger	35.00/ —	35.00/ 40.00	40.00/ —	27.50/ —
White Ledger	55.00/ 60.00	55.00/ 60.00	55.00/ —	35.00/ 40.00
Mixed Book & Mag.†	18.00/ 20.00	20.00/ 21.00	12.00/ —	— / —
No. 1 Books‡	25.00/ 27.00	24.00/ 26.00	27.50/ —	— / —

† Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% of groundwood. § Deld.

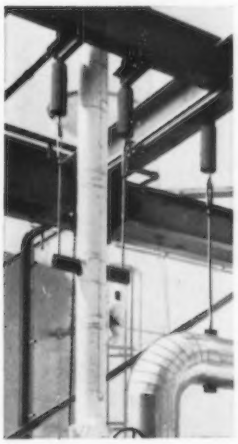
always in the market

pioneer paper stock company graders and packers of waste paper

BLAW-KNOX has what it takes—to provide these products and services

Large chrome moly pipe being readied for shipment to new generating station. Making a right angle bend followed by a 24 degree, 18 foot bend in this heavy 27½ inch chrome moly pipe required all the skill and modern facilities of the Blaw-Knox power piping shop. Before shipment, piping is heat-treated and ultrasonically tested with a radar-type device for detection of any defects.

A new Blaw-Knox "6 x 6" Flexibility Matrix Method of computing stresses in power piping systems is now available to consulting engineers, companies, and individuals responsible for the design of power piping systems. By the use of an electronic computer this method cuts calculating time from months to a day; assures full accuracy to six significant figures; and has no limitations on the complexity of the system. Write for further information about our new "6 x 6" Flexibility Matrix Method.



Two-way control over movement of piping is provided by Blaw-Knox functional spring hangers with the patented internal swivel action—shown in this modern outdoor generating station. Our experienced engineers are available to both design and make recommendations for your hanger requirements. To get full information, write for Catalog No. 54.

Each year serious fire strikes one out of every seven manufacturing firms in this country. Be safe. Let a Blaw-Knox fire-protection engineer study your needs—and explain how you can pay for the system on our lease or deferred payment plan. To get more information send for Bulletin No. 2426—"Fire Can Destroy Your Business."

BLAW-KNOX

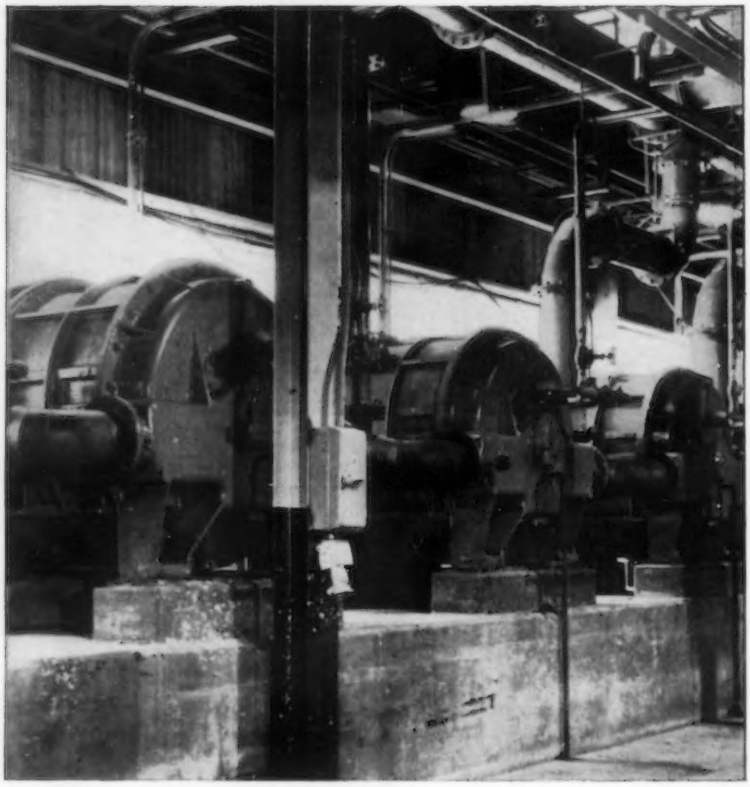
BLAW-KNOX COMPANY

Power Piping and Sprinkler Division

829 Beaver Avenue • Pittsburgh 33, Pennsylvania

Complete facilities for prefabrication and erection of piping systems for all pressures and temperatures
. . . complete line of standard and custom-engineered pipe hangers, supports and vibration eliminators
. . . complete line of automatic sprinkler systems for standard and special hazards

What, actually, do Vacuum Pumps on paper machines handle?



Paper mill engineers know that it is actually a mixture of air and water vapor, but the custom of rating vacuum pumps in terms of air capacity alone causes this important fact to be frequently overlooked.

The presence of this water vapor causes a considerable reduction of the effective air handling capacity of any vacuum pump except the Nash. In the Nash Vacuum Pump the bulk of this water vapor is effectively condensed, due to the Nash operating principle. The air handling capacity of the Nash is therefore not reduced.

That is one of the reasons why Nash Vacuum Pumps are standard in over a thousand leading Paper Mills.

NASH ENGINEERING COMPANY

443 WILSON ROAD, SO. NORWALK, CONN.

PRICES OF MATERIALS

Aluminum sulphate:
coml. bags, c.l. wks. .....cwt. $1.85 / —
iron-free, c.l. wks. .....cwt. 3.55 / —

Casein, acid prec.:
dom. sh. pt. c.l. (30 mesh) cwt. 31.00 /32.00
Arg. ex. dock, duty paid. cwt. 22.75 /23.75
New Zealand, do. .....cwt. 26.00 /27.00

Caustic soda:
c.l. wks. solid, 76% .....cwt. 4.30 / —
flak. & grd. drums, c.l. ...cwt. 4.70 / —
liquid 50% tanks.... 2.90 / —
liquid 73% tanks.... 3.00 / —

China Clay
dom., dry-grd., airfloat:
325 mesh, bgs,. c.l. Geo. ton 10.00 /
300 mesh, bgs., c.l. Geo. ton 13.50 /14.50
imp., white, lump, c.l. ex. dock 20.00 /35.00

Chlorine:
single-unit tanks, works.. cwt. 3.15 /
multiple unit, 2-5 cars per yr. 5.25 / 4.05

Formaldehyde
37% (inh. 8% methanol) USP:
drums, c.l. dlvd. .....lb. .0715/ —
tank-cars dlvd. .....lb. .045 / —

Lime:
hydrated, bulk, c.l. N.Y. ... ton 22.32/ —
quicklime, bulk, c.l. N.Y.....ton 20.82/ —

Gum rosin:
K, M, N, drums, c.l. Savan. cwt. 7.35 / 7.85

Rosin size:
70%, gum & pale paste, tank
cars, south, sh. pt. .....cwt. 7.44 / 7.48

Saltcake:
dom. bulk, 100% anh. wks, ton 28.00 / —

Soda ash:
light, 58% ash bags, wks...cwt. 1.85/ —
bulk, c.l. wks. .....cwt. 1.55/ —

Sodium peroxide:
dms. c.l. E. of Miss. .....lb. .20 / —
l.c.l. (same basis) ..... .20½/ .21

Sodium silicate, 40° Be.:
tank-cars, wks. .....cwt. 1.20 / —
drums, c.l. wks. .....cwt. 1.55 / —
(47°) Be. WW.
tank-cars, wks. .....cwt. 1.90 / —
drums, c.l. wks. .....cwt. 2.25 / —

Soybean, protein:
chem. isol., wks. c.l. bags...lb. .23 / —

Starches:
corn, multiwalls, c.l. prod. plant:
pearl ..... cwt. 6.49 / 6.75
white, dextrins .....cwt. 8.08 / 8.20
chlorinated ..... cwt. 8.25 / 8.35
potato, Idaho, c.l. wks. ..cwt. 6.25 / —
East, fr. all. 50 cents cwt.
potato, Maine, f.o.b. wks. cwt. 6.25 / —

Sulphuric acid:
60° Be. cbys. c.l. wks.....cwt. 2.00 / —
l.c.l. wks. .....cwt. 2.45 / —
tank-cars, wks. ..... ton 18.60 / —

Sulphur:
crude, c.l. mines, contract.
long ton 26.50 / —
f.o.b. vessels Gulf dock ...ton 28.00 / —

Sulphur dioxide:
liquid, coml. cyl., wks. .....lb. .10 / 12
multi-unit cars, wks. .....lb. .0535/ —

Talc, fibrous grd., bags:
c.l. wks., N.Y. .....ton 28.00 / —
l.c.l. wks., N.Y. ..... ton 31.00 /36.00

Titanium dioxide:
anstase, c.l. dlvd. E. bags..lb. .25½/ —
l.c.l. dlvd. .....lb. .26½/ —
rutile, c.l. dlvd. .....lb. .27½/ —
l.c.l. dlvd. .....lb. .28½/ —

SCAPA
the originators of
Cotton Dryer Felts
woven with
Synthetic Reinforcement
U.S. PATENTS APPLIED FOR
Five years of experimentation—laboratory research and field tests are behind SCAPA 'S'-Type Reinforced Cotton Dryer Felts. They have exactly the right proportion of synthetic and cotton, scientifically combined.
They are out-performing regular Cotton dryer felts, averaging 50% longer runs, and in some cases 100%.
SCAPA Dryer Felts are running all over the world!
Can be furnished with our famous GREEN DACRON EDGE when desired (U.S. PATENT 2,612,190). These reinforced edges of pure, spun Dacron will outwear the felt, under the most severe conditions.
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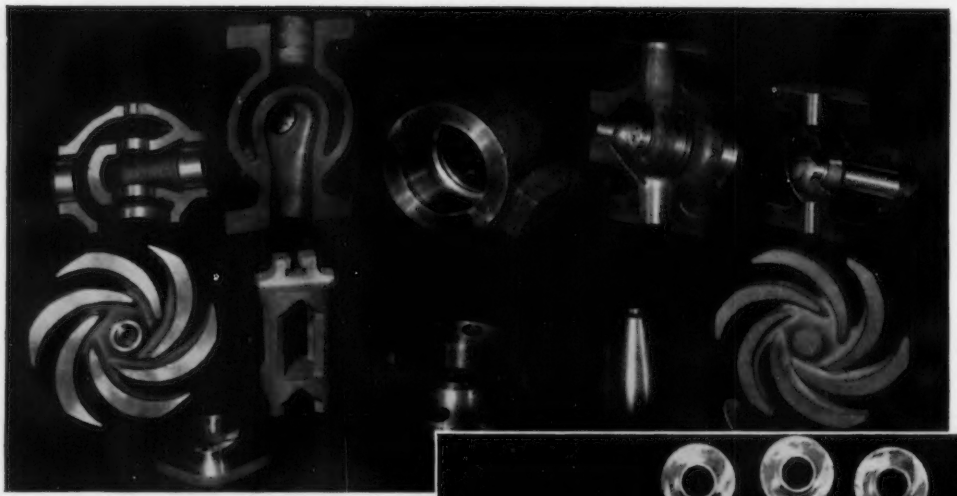
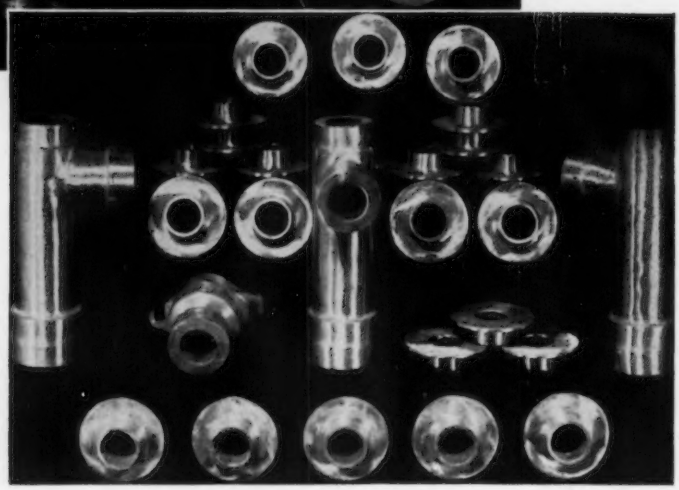
309 SOUTH STREET, FITCHBURG, MASSACHUSETTS
Sole U. S. Agents for
SCAPA DRYERS, INC.
WAYCROSS, GEORGIA





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Write for this book on A-L STAINLESS STEEL CASTINGS

28 pages of valuable and complete data on stainless castings: analyses, properties, technical data on handling and heat treatment, typical applications, how to order, etc.

ADDRESS DEPT. PT-88

Every stainless casting produced by our Buffalo Foundry carries the familiar A-L Star trademark, cast into the steel. That means it's Allegheny Ludlum *time-tested* stainless steel—a pioneer that has successfully answered thousands of difficult corrosion and heat resisting problems.

It not only means experience in stainless casting applications, but in maintained high quality, too. The A-L Buffalo Foundry is a pioneer in both the vertical-centrifugal and static methods of casting stainless steel. You can depend upon Allegheny stainless castings to be strong, clean-surfaced, sound-structured and easy-machining . . . fully in accord with the service conditions and with your requirements for delivery.

Let our stainless foundry specialists quote on *your* casting needs—any size, up to thousands of pounds—regular production quantities or problem jobs. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

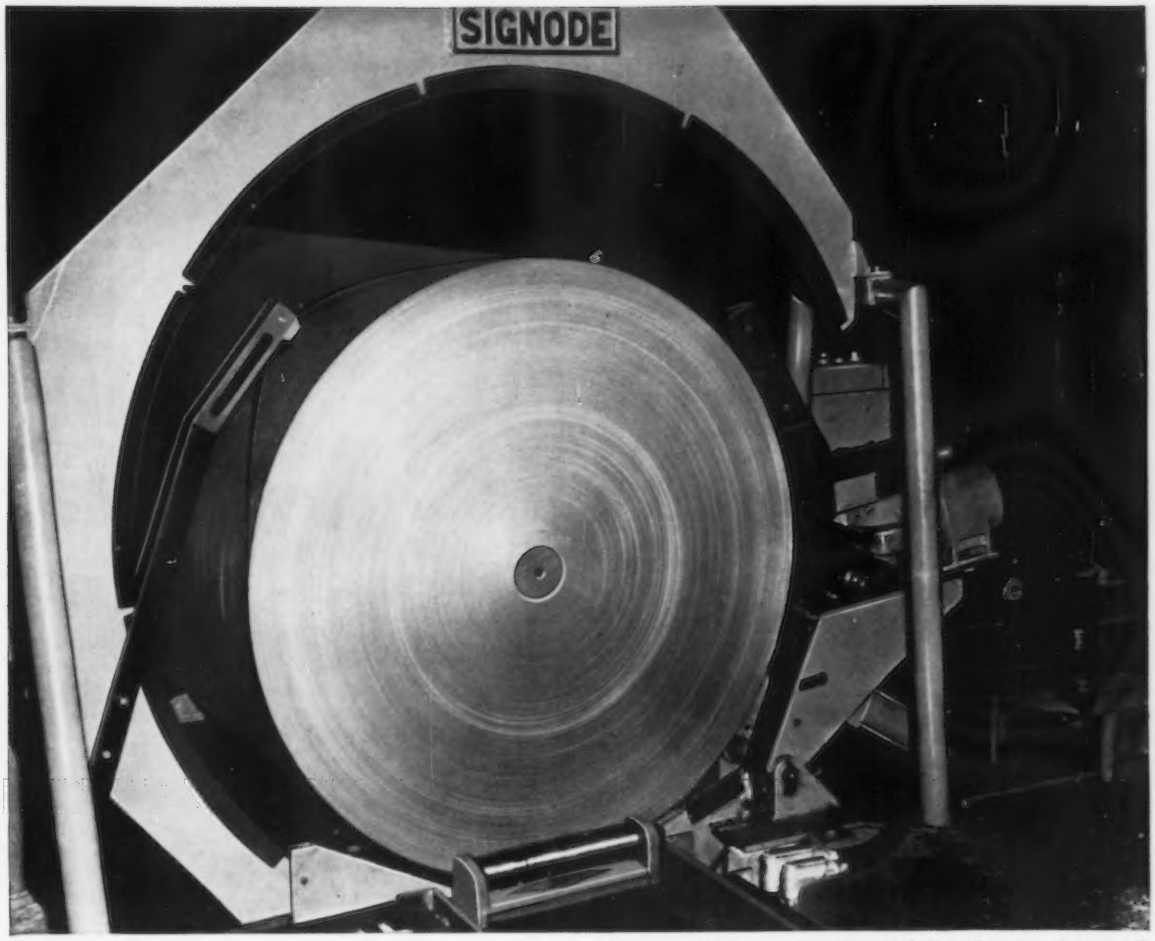
WSW 6535

Make it BETTER—and LONGER LASTING—with

Allegheny Stainless

AL ALLEGHENY LUDLUM ®

Warehouse stocks carried by all Ryerson steel plants

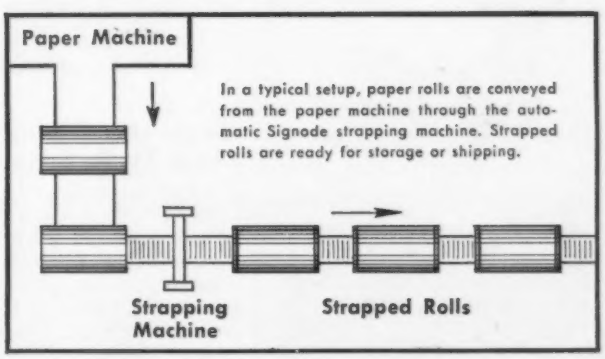


Machine applies strapping uniformly close to the edge of every roll.

Now! Automatic roll-end binding!

This new Signode roll-end binding machine is automatically controlled and operated. The strapping is straight, close to the edge, and uniformly tight and secure on every roll. The machine handles rolls from 32 inches to 60 inches in diameter and of any width —straps them more than fast enough for the largest of finishing room operations . . . automatically and dependably positions, tensions, seals, and cuts off the strap as the rolls are conveyed through it. There's nothing else like it!

These machines are now in operation in modern paper mills. For information on this important new development in the paper industry, call the Signode man near you, or write:


Paper Machine
In a typical setup, paper rolls are conveyed from the paper machine through the automatic Signode strapping machine. Strapped rolls are ready for storage or shipping.
Strapping Machine
Strapped Rolls

SIGNODE STEEL STRAPPING CO.

2677 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide.
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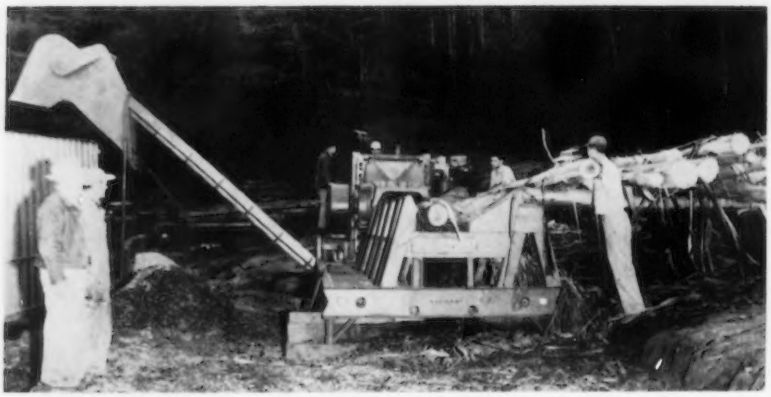
NEW EQUIPMENT AND SUPPLIES



Whole Eucalytus Logs Chipped in the Field

Among new methods of chip supply, recently developed by the Sumner Iron Works, Everett, Wash., is this complete chipping plant powered by a diesel engine and mounted on a trailer for portability. The chip conveyor for loading trucks or box cars is positioned on the trailer bed beside the feed conveyor for transporting as a unit. The entire plant is 8 feet wide and 34 feet long. Weight is approximately 40,500 pounds.

The unit pictured here was designed to produce chips from Eucalyptus logs up to 16 inches diameter and 20 feet long. The chips are being used at the San Joaquin Division of Fiberboard Products in Antioch, California.

Handy laboratory assistant

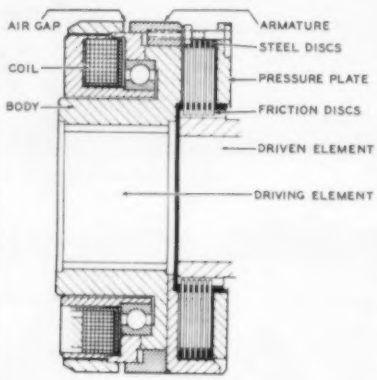
Here's a disc mill for your laboratory . . . to do miscellaneous grinding jobs of either wet or dry material; to refine cooked chips and knotter or screen rejects; to fluff dry pulp samples.

For details and bulletin on the Bauer Laboratory Mill, write us or call FAirfax 3-5501.

The Bauer Bros. Co.

DISC REFINER HEADQUARTERS

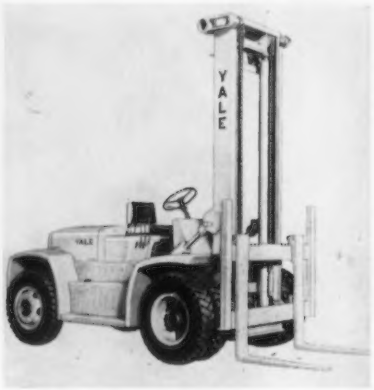
1758 Sheridan Ave. • Springfield, Ohio



Magnetic Clutch Said To Be Superior

Fawick Airflex Division, Fawick Corp., 9919 Clinton Rd., Cleveland, Ohio, announces the new Fawick Magnetic Clutch. Patented design features include comparatively short axial, and small radial dimensions, complete isolation of the magnetic assembly from the integral mechanical parts, and compact, precision assembly of all component parts. It is furnished in stationary field or brush types and for either "wet" or "dry" operation.

Many operating advantages are claimed for the Fawick magnetic clutch. First among these is fast operating speed in both engagement and disengagement. The clutches are reported to provide complete torque control under all rated conditions—through push buttons, relays, or limit switches, etc. They are easily adapted to modern machine tools, and have a wide range of bore sizes. Sizes from 2 to 13 inches are available.



15-20 Ton Lift With New Fork Truck

The Yale & Towne Manufacturing Co., 11,000 Roosevelt Blvd., Philadelphia, Pa., has a new line of large, gasoline powered, pneumatic tire lift trucks.

Outstanding among the many new features in the Yale G-3 line are the channel construction which is reported to provide 300 percent more visibility for the operator, the load stability heretofore impossible in this capacity industrial lift truck, and the fastest possible cyclic rate of operation within the limits of safety.

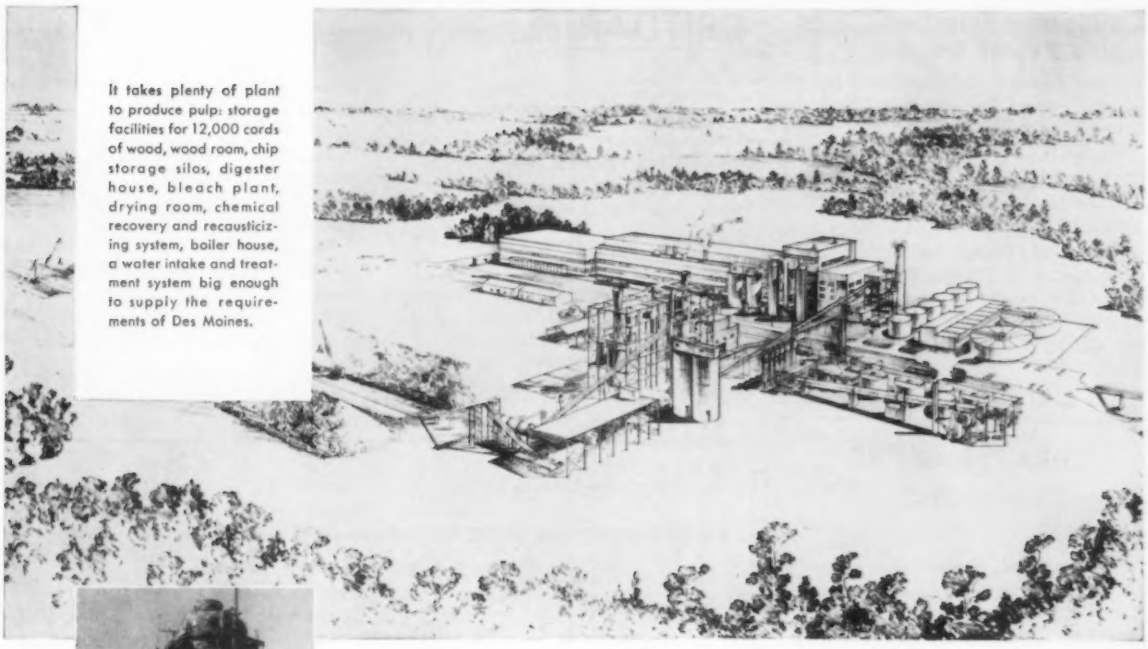
The line is being introduced in 15,000 — 16,500 — 18,000 and 20,000 pound capacity models powered with gasoline or LP-Gas and utilizing either a straight, friction clutch transmission or fluid coupling transmission.

The Yale truck with fluid coupling transmission is powered by a Chrysler V-8 industrial engine which develops 105 horsepower at 2800 R.P.M. With a friction clutch transmission a Ford V-8 industrial engine of equal horsepower is used.

Both drive units have four speeds forward and four reverse which provide rugged, pulling power when needed with efficient gas-saving "over the road" gear ranges for transit.

Calculator in Your Pocket

A small, easy-to-carry, circular sliderule is available from Silver Bells Ltd., 600-16th St., Oakland, Calif. Called the "Controller", the calculator is reported to have the performance of a 23 centimeter sliderule, but fits in the smallest pocket. Diameter of the Controller is 7.3 centimeters.



It takes plenty of plant to produce pulp: storage facilities for 12,000 cords of wood, wood room, chip storage silos, digester house, bleach plant, drying room, chemical recovery and recausticizing system, boiler house, a water intake and treatment system big enough to supply the requirements of Des Moines.

More and better production is provided by one of the first Kamyr continuous-digester installations in the U. S. Wood chips are steamed, then discharged under pressure into digester (shown here under construction) that completes the change into pulp.

FERGUSON speeds design and construction of market pulp mill for Gulf States Paper

Twenty months after contract date, Gulf States Paper Corporation's pulp mill at Demopolis, Alabama, will be completed and producing 275 tons of bleached pulp per day. Because of Ferguson's synchronized speed, actual construction of the complex plant was underway four months after engineering was started. This is the fourth project for Gulf States Paper awarded to Ferguson since it was assigned the major expansion of the company's main plant at Tuscaloosa in 1946.

Ferguson's ability to convert sites into producing plants in record time at lowest possible cost is the reason so many companies call upon Ferguson time and time again. Whatever you make or process, you'll find Ferguson's one-contract, one-responsibility service can do the same for you.

ENGINEERS H·K·FERGUSON BUILDERS

THE H. K. FERGUSON COMPANY

Subsidiary of Morrison-Knudsen Company, Inc.

Executive Office: **Cleveland 14, Ohio.** ***Other Offices:*** **New York • Ft. Lauderdale, Florida • Cincinnati • Chicago • Los Angeles • San Francisco • Atlanta • Toronto • London, England**

Chillicothe Employes Again Reject Union

For the fourth time in 23 years, Chillicothe Paper Co. employes have rejected a bargaining agent.

An election, held under supervision of the National Labor Relations Board, resulted in a 169-147 vote against the AFL-CIO Papermakers' Union.

Austin P. Story, president of the company, now a Mead Corp. affiliate, said there were 334 employes eligible to vote. Previous attempts to unionize the mill were made in 1956, 1945, and 1934.

OBITUARIES

William E. Mayall, 73, retired paper box manufacturer, died recently, in the Presbyterian Hospital, Philadelphia.

He had been associated with his father, the late Lewis A. Mayall, in business.

Fred A. Dieckbrader, 52, manager of mills in the Hinde and Dauch Paper Co. of Canada Ltd., died March 31.

Mr. Dieckbrader began his career in the paper industry 40 years ago. In 1928 he moved to Canada and four years later he joined Hinde and Dauch to organize and supervise the paper box division.

Joseph W. Taggart, 94, former vice president of the old Taggart Brothers Paper Co., now the Taggart Paper Mills, Watertown, N. Y. died April 1.

Mr. Taggart, whose family has been identified with papermanufacturing interests in Jefferson County since the early days of the industry, had been in declining health during the past few years.

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Figures of the Week

PAPER PRODUCTION RATIO REPORT—American Paper & Pulp Ass'n. Figures

(Production as percent of normal capacity)

COMPARATIVE WEEKLY SUMMARIES

1957	Mar. 2 95.2	Mar. 9 96.8	Mar. 16 96.0	Mar. 23 96.1r	Mar. 30 94.7
1956	Mar. 3 102.1	Mar. 10 102.5	Mar. 17 103.8	Mar. 24 104.2	Mar. 31 102.2

r Revised.

COMPARATIVE MONTHLY SUMMARIES

Year	Jan	Feb	Mar.	Apr	May	June	July	Aug	Sept.	Oct	Nov.	Dec.	Year Avg.
1956	99.6	102.6	102.9	102.5	101.8	99.9	85.6	96.7	94.3	99.5	97.6	90.9‡	97.9
1957	94.1‡	96.5‡											

‡ Preliminary.

COMPARATIVE YEARLY SUMMARIES

	1950	1951	1952	1953	1954	1955	1956	1957
Year to Date	95.1	100.2	97.0	94.6	94.1	95.3	101.2	95.9
Year Average	95.8	98.0	88.6	92.3	91.6	94.9	97.9	

All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

Note: In the above tables all the ratios shown are on the basis of a normal 6 and 7 day capacity.

PAPERBOARD OPERATING RATIOS†

COMPARATIVE WEEKLY SUMMARIES

1957	Mar. 2 92	Mar. 9 95	Mar. 16 95	Mar. 23 95	Mar. 30 92
1956	Mar. 3 99	Mar. 10 100	Mar. 17 99	Mar. 24 98	Mar. 31 101

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1956	100	100	99	100	99	98	77	95	89	96	93	84	94
1957	91	94											

† *Percents of operation based on "Inch-Hours" reported on a 6-day basis to the National Paperboard Association.*

SUMMARY OF PAPERBOARD STATISTICS—National Paperboard Ass'n. Figures

ITEM	THIS WEEK ENDING Mar. 30, 1957	LAST WEEK ENDING Mar. 23, 1957	CUMULATIVE TO DATE Jan. 1 to Mar. 30, 1957
% Activity	92%	95%	93%
	Tons	*Tons*	*Tons*
Total Production	274,516	288,866	3,464,234
Liner	94,008	97,189	1,177,320
Corrugating Material	39,969	44,844	525,305
Chip & Filler Board	6,042	4,896	65,461
Total Containerboard	140,019	146,929	1,768,086
Folding	56,228	52,231	650,724
Set-Up	10,745	12,180	150,669
Special Food Board	22,854	26,551	296,366
Other	44,670	50,975	598,389
Total Boxboard	134,497	141,937	1,696,148
Total Orders	*Tons*	*Tons*	
Received	275,692	257,167	
Unfilled End of Week	408,271	408,010	

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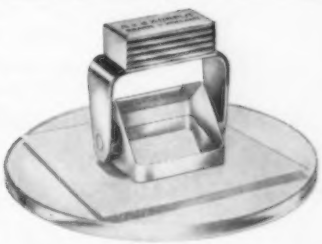

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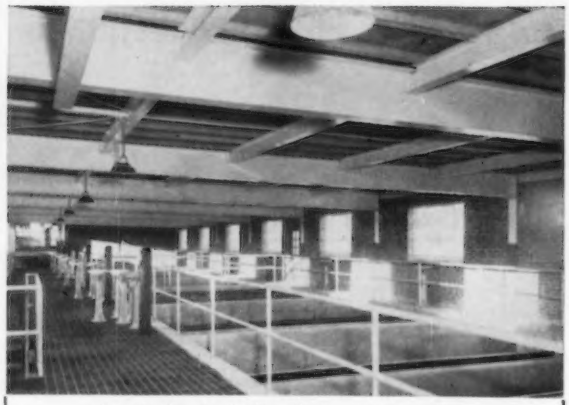

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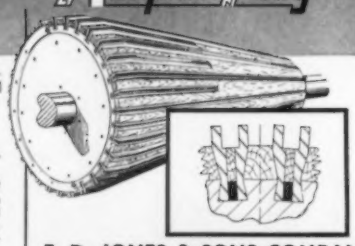

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M-4

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7—14 Plate Impco Flat Screens, Bronze Vats, latest type, direct motor drives, S.S. Plates.
1—Waxing Machine, complete with Vilter Refrigeration Equipment and Drives.
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1—Brightwood Box Machine, 6" Model Automatic Rotary Feed, End Shredder (60 per minute), Complete.
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1—84" Kamyr Machine Complete, 75 Ton per day.
1—25" Dia. x 156" Suction Couch Roll.
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1—No. 2 Jones Pulper. Anti Friction Bearings. Spare Worm.
1—Cowls Hydraslusher Model 10 SD.
1—90 H.P. Terry Turbine. Type G-4000/1000 RPM. For Paper Machine Drive. Complete.
1—74" x 32" Saveall, complete with rubber suction couch.
1—8' x 10' Oliver Vacuum Filter.
2—Impco Pulp Screens.
2—No. 3 Impco Knotter Screens—S.S. Plates.
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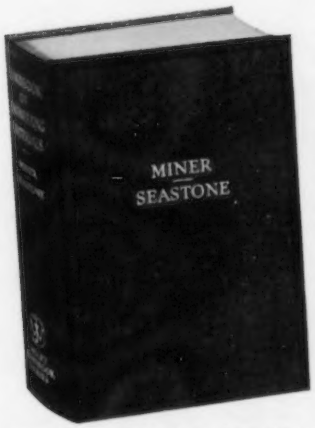

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While we strive for accuracy in preparing the above index which is purely a service to our readers, we cannot be responsible for errors.

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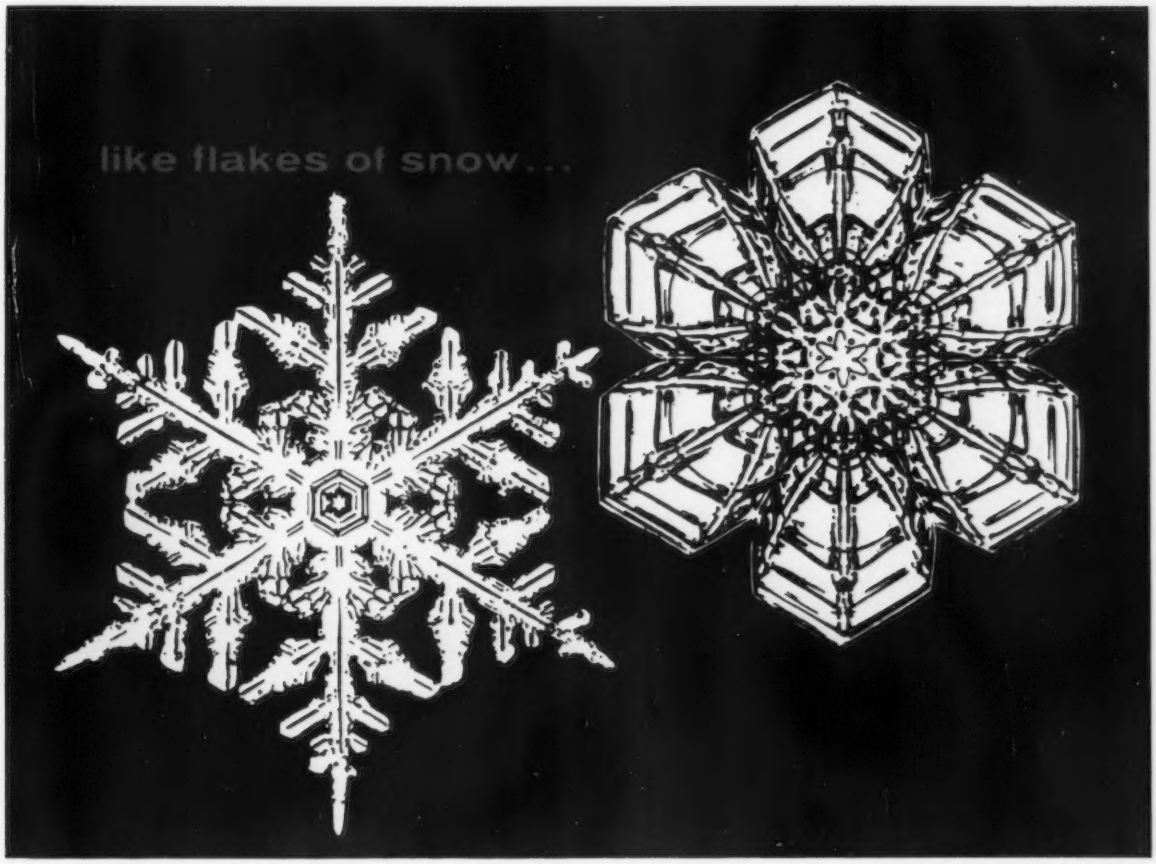

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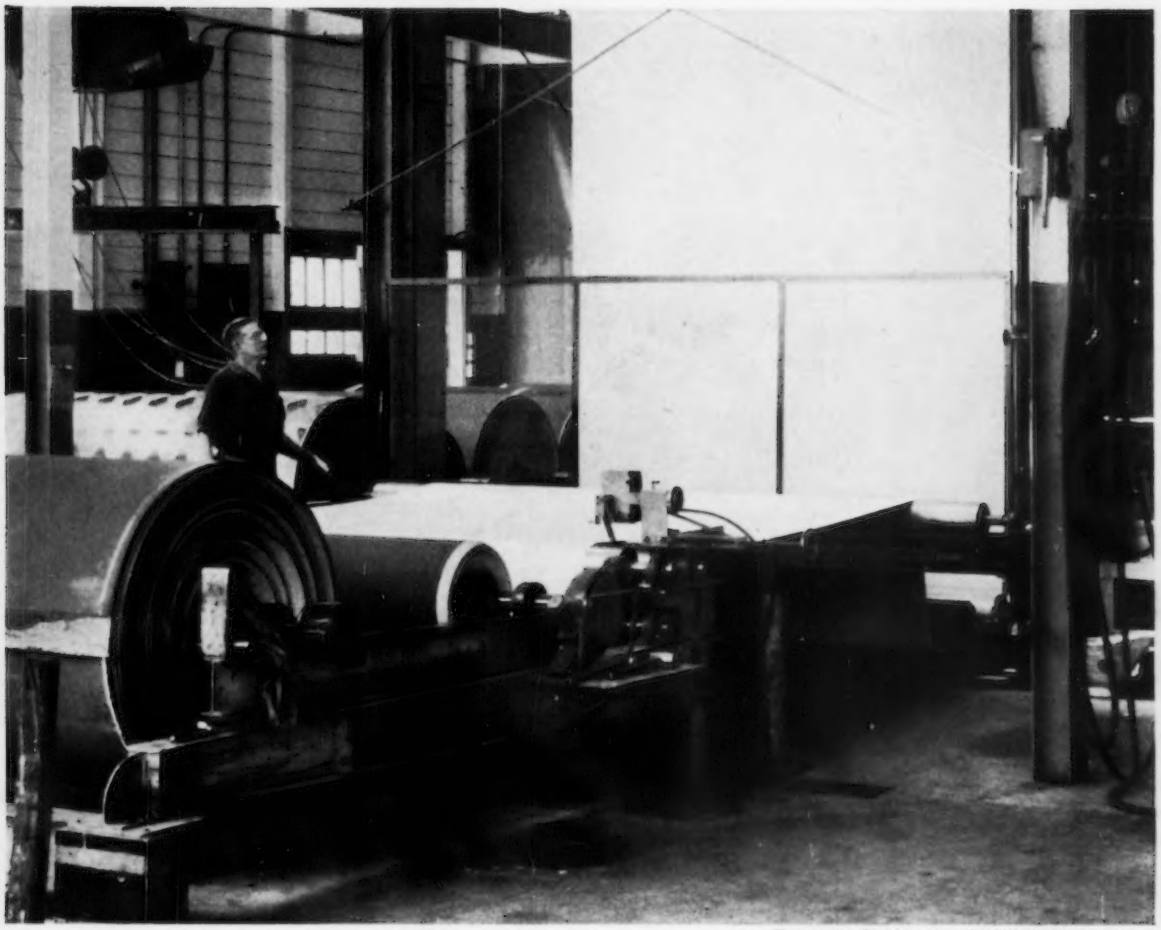

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